DOCUMENT RESUME

ED 240 270 CE 038 053

AUTHOR	Hall, William L.; Adams, Kay A.
TITLE	A System Design for Evaluating Vocational Education Research and Development.
INSTITUTION	Ohio State Univ., Columbus. National Center for Research in Vocational Education.
SPONS AGENCY	Office of Vocational and Adult Education (ED), Washington, DC.
PUB DATE	84
CONTRACT	300-83-0016
NOTE	97p.
PUB TYPE	Reports - Evaluative/Feasibility (142)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	Data Collection; *Educational Research; *Evaluation Methods; Models; Postsecondary Education; *Program Development; Program Effectiveness; *Program Evaluation; *Research and Development; Research Methodology; Secondary Education; *Vocational Education

ABSTRACT

This feasibility study contains a design for evaluating vocational education research and development (R & D). The study developed a model for evaluating vocational education R & D based on legislative frames of reference for research, exemplary projects, and curriculum development. Called an Impact Tracer Model, the program is based on information and observations taken from distribution records of 308 vocational education R & D products, utilization data from 12 exemplary products distributed nationwide, and impact data from 6 field sites. The five-stage model consists of needs assessment, product development, product dissemination, product use, and product impact. Some of the conclusions reached through the study are the following: (1) distribution data are easier to acquire and less expensive to obtain than product use or impact data; (2) most research coordinating unit directors are willing and able to provide distribution data; (3) superficial data on use can be obtained by mail, but detailed documentation requires observation or interviews; (4) baseline measurements should be established when assessing impact; (5) interactive methods are necessary for collecting impact data; and (6) data on product use and impact are collected by few states at present. The study recommends that a comprehensive and continuing vocational education R & D evaluation system be implemented in phases beginning with the collection of distribution data on all qualified R & D products. The appendices include survey instruments and a conceptual framework for assessing impact. (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED240270

A SYSTEM DESIGN FOR EVALUATING VOCATIONAL EDUCATION RESEARCH AND DEVELOPMENT

William L. Hull
Kay A. Adams

The National Center for Research in Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

1984

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

✓ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

CE 038053

THE NATIONAL CENTER MISSION STATEMENT

The National Center for Research in Vocational Education's mission is to increase the ability of diverse agencies, institutions, and organizations to solve educational problems relating to individual career planning, preparation, and progression. The National Center fulfills its mission by:

- Generating knowledge through research
- Developing educational programs and products
- Evaluating individual program needs and outcomes
- Providing information for national planning and policy
- Installing educational programs and products
- Operating information systems and services
- Conducting leadership development and training programs

FUNDING INFORMATION

Project Title:	National Center for Research in Vocational Education, Applied Research and Development Function
Contract Number:	300830016
Project Number:	051MH30001
Act under Which Funds Administered:	Education Amendments of 1976, P.L. 94-482
Source of Contract:	U.S. Department of Education Office of Vocational and Adult Education Washington, D.C. 20202
Contractor:	The National Center for Research in Vocational Education The Ohio State University Columbus, Ohio 43210
Executive Director:	Robert E. Taylor
Disclaimer:	This publication was prepared pursuant to a contract with the Office of Vocational and Adult Education, U.S. Department of Education. Contractors undertaking such projects under government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or options do not, therefore, necessarily represent official U.S. Department of Education position or policy.
Discrimination Prohibited:	Title VI of the Civil Rights Act of 1964 states: "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Title IX of the Education Amendments of 1972 states: "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education Project, like every program or activity receiving financial assistance from the U.S. Department of Education, must be operated in compliance with these laws.

TABLE OF CONTENTS

	Page
LIST OF TABLES AND FIGURES	v
FOREWORD	vii
EXECUTIVE SUMMARY	ix
CHAPTER 1. INTRODUCTION	1
Need for Comprehensive Evaluation of Vocational Education R&D	1
Objectives of the Feasibility Study	4
Methodology Used to Develop This Design	5
CHAPTER 2. THE EVALUATION MODEL	11
Background for Model Development	12
Needs Assessment	15
Product Development Standards for Quality Control	16
Strategies for Data Collection	17
Criteria for Measuring Impact	24
CHAPTER 3. STRATEGIES FOR IMPLEMENTING THE SYSTEM	29
Comprehensive versus Selective Data Collection	30
Alternative Cost Scenarios	31
Utilization of Impact Evaluation Results	44
Local, State, and National Partnerships	47
CHAPTER 4. SUMMARY	51
Conclusions	52
Recommendations	52
APPENDIX A. SURVEY INSTRUMENTS	55
APPENDIX B. A CONCEPTUAL FRAMEWORK FOR ASSESSING IMPACT	71
APPENDIX C. GLOSSARY OF TERMS	85
REFERENCES	89

LIST OF TABLES AND FIGURES

		Page
FIGURE 1.	TRACER MODEL OF R&D IMPACT EVALUATION	14
FIGURE 2.	ILLUSTRATIVE DATA COLLECTION STRATEGIES FOR EVALUATING PRODUCT DISTRIBUTION, USE, AND IMPACT	18
TABLE 1.	OPTIONS FOR COLLECTING R&D PRODUCT IMPACT DATA	35
FIGURE B-1.	INTERFACE RELATIONSHIPS AMONG INSTITUTIONS CONCERNED WITH QUALITY AND UTILITY OF VOCATIONAL EDUCATION R&D.	74
FIGURE B-2.	CONCEPTUAL FRAMEWORK	76
FIGIRE B-3.	LINEAR SEQUENCE FOR EVALUATION ACTIVITIES . . .	82
FIGURE B-4.	DIMENSIONS OF IMPACT	83

FOREWORD

Vocational education research and development (R&D) represents one of the primary means of improving practice in educational agencies at the local, state, and national levels. R&D can be effective as a program improvement strategy only if government officials make prudent investments of scarce resources. This technical report helps them do this by proposing a system for evaluating the effectiveness of vocational education R&D. It contains an evaluation model, strategies for implementing product assessments, and options for operating a comprehensive evaluation system at different levels of effort.

This report is intended for policymakers and decision makers in the federal government and in state governments who allocate resources for research and development (R&D) in vocational education. These are U.S. Office of Vocational and Adult Education staff, research coordinating unit directors, and curriculum coordinating center directors, among others.

The information in this report should be used to build more accountability into R&D activities at each level of government. Evaluation activities must be designed for the unique needs of each state and/or project. The outcome of a comprehensive evaluation system should be increased R&D impact on classrooms and students.

We acknowledge the assistance of David P. Crandall, Executive Secretary of The Network, Inc., and Doren Madey Pinnell, Director of Corporate Relations, The Fuga School of Business, Duke University, who reviewed draft manuscripts of this report. Comments from M. Catherine Ashmore, Program Director of Product Management for the National Center and Wesley E. Budke, Program Director for the National Center Clearinghouse, on the draft manuscript also were appreciated. Assistance in typing the manuscript was provided by Jeani Gray and editorial assistance was provided by Connie Faddis.

Robert E. Taylor
Executive Director
National Center for
Research in Vocational Education

EXECUTIVE SUMMARY

This feasibility study report contains a design for evaluating vocational education research and development (R&D). Very few components of this design are currently "in place" nationwide. These components are intended to help build a continuing and comprehensive evaluation system of vocational education R&D.

This study developed a model for evaluating vocational education research and development, based on legislative frames of reference for research, exemplary projects, and curriculum development. These R&D activities include Programs of National Significance and state-administered projects. The model suggests a relatively low-cost evaluation system that uses existing reporting mechanisms at the national, state, and local levels.

The model is based on information and observations taken from (1) distribution records from 308 vocational education R&D products, (2) utilization data from twelve exemplary products distributed nationwide, and (3) impact data from six field sites. These data are presented in a companion document entitled Summary of Dissemination Outcomes (Hull 1983). Additional insight was obtained from state-of-the-art literature reviews, suggestions from consultants, and experiences with prior impact assessment activities.

The five-stage Impact Tracer Model described in this report assumes the following:

- Program improvement is issue-oriented and site-specific; that is, the worth of a product for resolving a problem on-site depends upon its relevance to the problem(s) at that site.
- The primary output from a funded R&D project, normally a R&D product, is the most usable vehicle for tracing effects of the projects.
- A high-quality R&D product, by itself, will not cause program improvement to occur; most cases require involvement of user audiences.
- Acceptance and use of an innovation developed elsewhere is less expensive to an adopting unit than developing the innovation.
- Accountability is the driving force behind most impact studies, although some reference to impact studies as baseline measures for future longitudinal studies may be found in the discussion of the model.

The five stages are (1) needs assessment, (2) product development, (3) product dissemination, (4) product use, and (5) product impact. Measurement criteria are presented in each stage addressing each of the following questions respectively:

- o What was the problem being addressed?
- o Did the product meet or exceed development standards?
- o Where did the product go?
- o What happened to the product at its destination?
- o What difference did the product make?

At the development stage, the criteria are presented as quality control standards. The first stage should be viewed as an attempt to identify the problem being addressed by a particular vocational education R&D project. The second stage is the development of a solution for the problem, in the form of a product. Stages three and four comprise the delivery system for transporting and implementing the results of R&D at particular sites. Stage five assesses the impact of the R&D product following an appropriate amount of lapsed time since introducing the product. Conclusions drawn in this report suggest the following:

- o Distribution data is easier to access and less expensive to obtain than product use or impact data.
- o Most research coordinating unit (RCU) directors are willing and able to provide distribution data, although some states are not organized to provide it by standard categories.
- o Superficial data on utilization can be obtained by mail, but detailed documentation requires observation and/or interviews with users.
- o Baseline measurements should be established when assessing impact.
- o Interactive methods (e.g., telephone and face-to-face interviews) are necessary for collecting impact data under most conditions.
- o Data on product use and impact are collected by very few states at the present time.

A comprehensive and continuing vocational education R&D evaluation system is recommended. It should be implemented in phases beginning with the collection of distribution data on all qualified R&D products. Product use studies should be targeted to specific samples of product recipients to determine if results are being applied to resolve problems. Impact studies should be conducted on high-priority needs only. Baseline data should be collected in advance of product use whenever possible.

CHAPTER 1

INTRODUCTION

This report describes options for evaluating vocational education research and development (R&D). Vocational education R&D is a diffuse enterprise, bounded somewhat by time and by levels of funding from federal and state governments. The report discusses the need for a continuing and comprehensive evaluation system and describes different segments of the enterprise. This chapter also includes a statement of objectives and a description of the methods used to conduct the feasibility study. Chapter 2 presents the evaluation model, including detailed descriptions of components. Chapter 3 discusses the options for implementing the model system. The final chapter summarizes the feasibility study and recommends an implementation option.

Need for Comprehensive Evaluation of Vocational Education R&D

The Vocational Education Act of 1963 (P.L. 88-210) contained the first broadly-based provisions for vocational education R&D in recent history. It authorized funds for research, training, and experimental pilot programs. The Vocational Education Amendments of 1968 (P.L. 90-576) revised the funding categories to include research and training, exemplary programs (demonstrations), and curriculum development. The Education Amendments of 1976 (P.L. 94-482) adjusted categorical funding by segmenting program improvement (Subpart 3) into research (Section 131), exemplary and innovative programs

(Section 132), and curriculum development (Section 133). Personnel training (Section 135) and vocational guidance and counseling (Section 134) also were listed under Subpart 3.

House Resolution 4164, proposed as the Vocational-Technical Act of 1983, contains authorization for research programs and curriculum development not only under basic grants to states (Title II), but also within program improvement (Section 305). Career guidance and counseling programs and vocational education personnel training programs also are listed under Section 305.

Throughout these acts, which authorize hundreds of millions of dollars, program improvement themes of research, demonstration, and personnel and curriculum development have occurred consistently. For example, a National Center for Research in Vocational Education was authorized under these acts and has been funded since 1965. These relatively homogeneous functions within program improvement have been ongoing for nearly two decades. A clear and present need exists for a system to evaluate their effectiveness.

A number of major evaluation studies have tried to determine the impact of vocational education R&D (e.g., Development Associates 1975; General Accounting Office 1974; Hu and Stromsdorfer 1975), but clear or consistent findings have been scant. Magisos and Moore (1977), after reviewing these evaluation studies, suggested that only programmatic efforts could adequately collect, process, and analyze data necessary for assessment of vocational education R&D. More recently, Kim

(1982) reviewed three nationwide studies and four state-level studies of R&D impact. His summary revealed positive effects of R&D projects in vocational education, but noted several limitations in interpreting the results. Chief among the limitations was the absence of direct observations and statistical significance tests of R&D project impact. There were few indications of "how much" impact occurred as a result of the R&D. There were conceptual and methodological problems with the studies.

Another reviewer of nationwide impact studies, Mohamed (1983), leveled three criticisms at the studies overall: (1) they lacked research design, (2) sample sizes were too small, and (3) descriptive studies were overabundant. The Committee on Vocational Education Research and Development (COVERD) (1976) had difficulty determining R&D impact, because measures often have been "subjective and difficult to validate and have failed to measure the long-term effects of R&D" (p. 3). Limited resources and constrained time lines have led the director of the Vocational Education Study (David 1983) to plead for "systematic follow-up on the consequences of federal policy . . . as the data become available" (p. 13). A system for evaluating the impact of vocational education R&D needs to be established.

Some steps have been taken to build more accountability into vocational education R&D. The current authorizing legislation for vocational education, Public Law 94-482, contains the following expectation for vocational education research:

> No contract shall be made. . .unless the applicant can demonstrate a reasonable probability that the contract will result in improved teaching techniques or curriculum materials that will be used in a substantial number of classrooms or other learning situations within five years after the termination date of such contract. (Section 131 b)

As recently as May 1983, a question was added to the U.S. Department of Education's form ED 590 requiring project abstracts to contain descriptions of processes used to assure high-quality products (Office of Vocational and Adult Education 1983). Information on the number of products produced from government-sponsored projects, their use, and their perceived impact could be collected from product users. For example, Haney (1980) of the Huron Institute argues for targeted evaluation research aimed at answering specific questions. Such a strategy, he says, "could be easily coordinated with a federal approach to evaluation of vocational education" (p. 4).

This feasibility study examines options for collecting data through a comprehensive evaluation system. The recommendations in chapter 4 may serve as a cornerstone in the framework for evaluating the impact of vocational education R&D.

Objectives of the Feasibility Study

The objectives of this feasibility study are as follows:

- To develop a model system for evaluating vocational education research and development
- To describe the costs and benefits of evaluative information provided by this system
- To determine the feasibility of implementing the system at different resource levels

The first objective is addressed in chapter 2; the second and third are discussed in chapter 3. A strategy for implementing the model is recommended in chapter 4.

The purpose of data collected through an evaluation system is to document the distribution, use, and impact of vocational education R&D products. This information is to be used for accountability and planning purposes. Primary users are government officials at the federal, state, and local levels, persons who are more interested in accountability than planning because they must accept responsibility for spending large amounts of taxpayers' money. Other audiences include those who are greatly interested in data collection methods, as well as results in program improvement processes. They are vocational education stakeholders, the Research Coordinating Unit (RCU) directors, the Curriculum Coordinating Center (CCC) directors, and others instrumental in funding, conducting, and reporting project results.

Methodology Used to Develop This Design

A four-pronged approach was used to establish the viability of this evaluation design. First, a technical review of project objectives and methodology was conducted by National Center staff members early in 1983. Underlying assumptions were explored and expectations established for the model evaluation system. Second, project abstracts and other literature on impact evaluation from computer searches of ERIC and other document databases were reviewed and a conceptual framework was developed for the evaluation system.

This conceptual framework guided the development of the model evaluation system. Third, this framework was shared with RCU directors at their annual meeting in March 1983, and with the National Network for Curriculum Coordination in Vocational and Technical Education (NNCCVTE) at their directors' council meeting in April 1983. The resulting framework and both deliverables of this project were subsequently reviewed by outside consultants. Fourth, observations were collected via three modes, telephone, from off-the-shelf records, and from interviews at six field sites, to establish the availability and feasibility of acquiring evaluation data.

This final thrust was used to refine questions for assessing the usefulness of vocational education R&D. Appendix A contains the evaluative questions submitted to the Office of Vocational and Adult Education (OVAE) for instrument clearance. These questions were based on results obtained from dissemination and utilization studies completed during the previous five-year contract with the U.S. Office of Vocational and Adult Education (Hull 1980, Hull 1982). Impact questions were developed from a broad base of R&D product studies, including the following: Adams, McKay, and Patton (1981); Anderson and Hull (1981); Bragg, Hull, and Adams (1981); and Modisette and Bonnett (1981). Impact criteria from these studies were summarized in a report by Hull, Adams, and Bragg (1983).

Limitations of This Research

It became necessary, early in this project, to limit the scope of this inquiry because of the diversity of projects and

quantity of products funded through vocational education program improvement. Project staff decided to apply a fairly strict definition of research and development associated with program improvement in vocational education. This interpretation adheres to the logic of the legislation and includes only those projects funded in research, exemplary/innovation, and curriculum development categories. Personnel training and vocational guidance and counseling projects are excluded.

A second limitation is related to R&D project outputs. Not all projects funded with federal monies resulted in products.* Even when they did, not all products were made available to the Educational Resources Information Center (ERIC) Clearinghouse on Adult, Career, and Vocational Education. Clearinghouse staff estimate that approximately half of the programs of national significance and/or state-administered projects result in documents accepted for inclusion in the ERIC database.

Despite these limitations, data collected for this feasibility study came from a wide variety of states (twenty-two of the thirty-two states with products in the ERIC database at the time the sample was selected). Communication with primary users (e.g., teachers and instrument users, such as RCU directors) was direct and informative. This occurred despite wide differences in the way states maintain their records and

---

*Federal funds flow to project directors through one of two sources. Either the projects are Programs of National Significance or they are state-administered program improvement projects funded from federal monies received as part of a formula grant.

great variability in the roles and organizations of the persons contacted. In general, the techniques used to collect data were relatively efficient.

The evaluation model described in the following chapter is intended as a model system capable of being used at the federal, state, or local level. A state or district may wish to implement a part or all of it. The criteria in the model may be applied superficially (e.g., a content analysis of project abstracts) or in-depth (e.g., in a series of interviews during site visits). The intensity of the data collection activities will depend upon the level of perceived need for the data and the resources (i.e., time and money) available to collect it.

Assumptions of the Model

The following assumptions undergird this evaluation model:

- Program improvement is issue-oriented and site-specific; that is, the worth of a product for resolving a problem on site depends upon its relevance to the problem(s) on that site.
- The primary output from a funded R&D project, normally a R&D product, is the most usable vehicle for tracing effects of the project.
- A high-quality R&D product, by itself, will not cause program improvement to occur; most cases require involvement of user audiences.
- Acceptance and use of an innovation developed elsewhere is less expensive to an adopting unit than developing the innovation.
- The model gives priority to accountability as the driving force behind most impact studies, although some reference to impact studies as baseline measures for future longitudinal studies may be found in the discussion of the model.

The system design for the evaluation model is to be continuing and comprehensive; that is, the design should include all aspects of R&D activities, particularly including measurement of the impact of products. An emphasis is placed on products as outputs of R&D projects, because products represent a tangible vehicle for transporting innovative ideas. No attempt has been made to downplay or set aside the many innovative and developmental contributions of local teachers and administrators. In fact, they represent the primary audience for many R&D products because they have to make the innovations work in their particular setting. However, in this evaluation model the emphasis is on development of products that can overcome the necessity of "reinventing the wheel" in educational settings.

CHAPTER 2

THE EVALUATION MODEL

At the heart of this system for evaluating vocational education R&D is an evaluation model capable of being implemented at the federal, state, or local level. This chapter (1) explains the model developed for evaluating vocational education R&D, (2) describes components in detail, and (3) discusses strategies for collecting data.

The substantive focus of this evaluation model is program improvement resulting from the use of R&D products. It includes both Programs of National Significance sponsored by the U.S. Office of Vocational and Adult Education and projects authorized through Sections 131, 132, and 133 of P.L. 94-482. The focus includes projects of research, exemplary programs, and curriculum development. Sections 134 and 135 of P.L. 94-482, personnel training and vocational guidance and counseling, are not included in the scope of this project. Projects authorized by sections 134 and 135 most often do not involve research and development activities.

Other models have included a wider scope of activities. The Florida Research Coordinating Unit model (1982), for example, included vocational guidance and personnel development within a program improvement framework. McCage (1980) included impact analysis following each of four components in a program improvement continuum. Researchers at the University of Illinois (Evans et al. 1982) examined three dimensions when designing

impact assessments: short term-long term, intended-unintended consequences, and direct-indirect effects. Hughes (1983) recommended a production framework for research within an input-output framework, where output included products, effects, and impact.

Background for Model Development

As indicated in the previous chapter, the vocational education R&D enterprise is widespread and diverse. It is defined here as including Programs of National Significance and state projects funded by program improvement federal monies. It includes applied research, curriculum development, exemplary programs, and on occasion, personnel development. To encompass all of these efforts, it was necessary to select an evaluation model capable of spanning a wide range of activities and of focusing on the audiences instrumental to program improvement in vocational education.

Several approaches to assessing the effects of R&D were considered; among them were the following:

- Exemplary site case studies. This approach to assessment looks for "best case" examples of R&D product use, then investigates them to determine what impact has been made. Case studies help us to understand why a product works, but the generalizability of results often are quite limited. The representativeness of the site may be difficult to establish, and costs of collecting interview data are high. This approach to impact assessment can be useful in establishing a "high water mark" measure of impact, but it should be used in conjunction with other assessment methods.

- Random sample of practice situations. This approach to assessment randomly selects classrooms, state agencies, or other groups of vocational educators who

might logically adopt R&D products. Organizations are stratified in advance, but there are very few limitations placed on the selection of practice units. Personnel in these units (e.g., teachers, principals, and so forth) are interviewed to determine if they have used any R&D products. This places a burden on them to remember the product and identify it with a particular practice occurring in the classroom. Often, people prefer to claim personal responsibility for a promising practice, and they do not remember where it came from. This approach was rejected as inefficient and ineffective.

- o R&D product tracer studies. This approach to assessment focuses on specific R&D products with the intent of describing their dissemination, use, and impact. One or more products may be studied simultaneously on one or more subject areas. A limiting feature of this approach is its exclusive focus on products; effects associated with participation in group activities or other nonproduct-related activities may therefore be lost. This strategy can be cost-effective if records are kept to support the objectives of the evaluation.

The "product tracer" approach to impact studies was chosen for the evaluation model because it fits many of the assumptions made in the conceptual framework. It is relatively low-cost in its data collection at the early stages of the model and it provides flexibility in the amount and quality of data produced.

The model illustrated in figure 1 should be read from left to right and from top to bottom. It contains five distinct activities: (1) needs assessment, (2) product development, (3) product dissemination, (4) product use, and (5) product impact. These impact evaluation elements correspond closely to the categories in the conceptual framework. Appendix B contains an explanation of the conceptual categories in the evaluation framework.

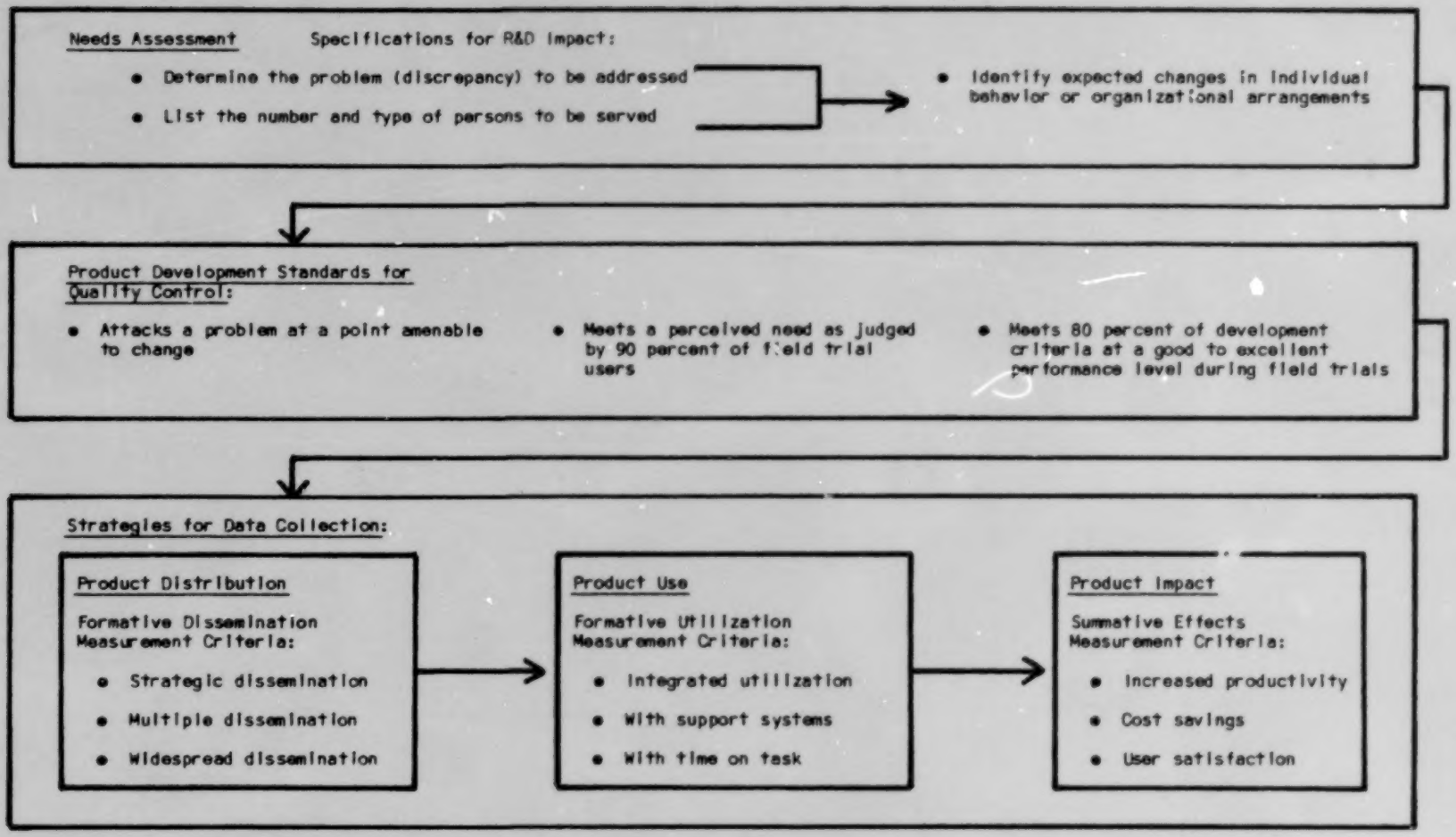
Needs Assessment
Specifications for R&D Impact:
• Determine the problem (discrepancy) to be addressed
• List the number and type of persons to be served
• Identify expected changes in individual behavior or organizational arrangements
Product Development Standards for Quality Control:
• Attacks a problem at a point amenable to change
• Meets a perceived need as judged by 90 percent of field trial users
• Meets 80 percent of development criteria at a good to excellent performance level during field trials
Strategies for Data Collection:
Product Distribution
Formative Dissemination Measurement Criteria:
• Strategic dissemination
• Multiple dissemination
• Widespread dissemination
Product Use
Formative Utilization Measurement Criteria:
• Integrated utilization
• With support systems
• With time on task
Product Impact
Summative Effects Measurement Criteria:
• Increased productivity
• Cost savings
• User satisfaction

Figure 1. Tracer model of R&D impact evaluation

Needs Assessment

The needs assessment component of the model emphasizes the importance of problem identification as the first step in evaluation of vocational education R&D. This component represents a systematic attempt to identify problems amenable to resolution through research. The success of an R&D project should be measured by its attainment of standards established during the needs assessment process. This process is easier to describe than it is to implement.

In reality, any identifiable problem is affected by a multiplicity of factors. Use of an R&D product is only one of many. The process of documenting need is fraught with difficulty. As Adams suggests (1983), needs sensing often fails to provide insightful and specific information. Educational goals are so general that it is difficult to obtain precise information. Also, controversial needs often are buried among measures of central tendency, which cluster ratings into a narrow middle range.

These technical problems are not discussed here. Instead, the reader is referred to the following documents, which review needs assessment processes and suggest measurement instruments/ techniques. For example, the National Center produced a paper (Ahmann 1976) on needs assessment for program planning in vocational education. It defines needs assessment as a discrepancy between actual and desired conditions, it reviews needs assessment methods, and discusses systems models for

planning vocational education programs based on empirical data. Another National Center publication (McCaslin and Lave 1976) on needs assessment focuses on career education. It describes available needs assessment instruments in this area and discusses approaches for statewide assessments. Witkin (1975) provides an excellent review of needs assessment techniques for educational planning at the local, intermediate, and state levels. The instruments reviewed tend to focus on substantive areas (e.g., career education, multicultural education, reading, etc.). For additional examples of needs assessment instruments, see the Educational Needs Assessment Handbook produced by the Arizona Department of Education (1976).

Product Development Standards for Quality Control

Examples of quality control standards that should be met prior to release of an R&D product are as follows:

- R&D product(s) should contain clear objectives, indicating not only the components of the product, but the extent of product use, as well.
- Each product should contain a detailed product cost analysis, including not only the anticipated operating costs, but installation and modification costs, as well.
- Information supporting claims for the product should be compelling and reported in sufficient detail to allow judgments on its merit or worth to potential users.
- Evidence of product effectiveness should rule out rival hypotheses, such as maturation or practice effects, and should establish causality between the product and program changes.
- The product should be free of bias related to racial/ethnic groups, sex, special needs populations, and occupational sterotyping.

- The product should be easy to use, readily divisible into operational programs, or adaptable for innovative activities.

The standards for quality control shown in the impact evaluation model (see figure 1) are at a different level of specificity than those just mentioned. The product development standards in figure 1 are more general and contain operational language typical of field trial formative evaluations. Standards must be simple, nonambiguous, acceptable to persons developing the products, easy to use, attainable within the resource limitations of the project, and acceptable to persons using the products.

Development of an R&D product should follow a systematic process. There are many authoritative references on this process. Baker and Schutz (1971) have produced an informative volume on instructional development. Pratzner and Walker (1972) have edited a similar volume on programmatic R&D in vocational education.

Strategies for Data Collection

There are few limits on strategies for collecting impact data. Evaluators should allow their imagination and the availability of information, unobtrusive and otherwise, to dictate assessment approaches. This section briefly describes three strategies and five techniques for data collection.

Figure 2 lists the strategies and areas for evaluating product impact. The matrix suggests salient techniques for collecting data related to three of the five questions included

Data Collection Strategies	Product		
	Distributive	Use	Impact
Product Census	• Records • Mail surveys		
Product Sample Surveys		• Telephone interviews • Mail surveys	
Case Studies			• Face-to-Face interviews • Baseline measurements

Figure 2. Illustrative data collection strategies for evaluating product distribution, use, and impact

in the tracer model of R&D impact evaluation. The questions are as follows:

- o Where did the product go? (distribution)
- o What happened to the product at its destination? (use)
- o What difference did the product make? (impact)

The distribution, use, and impact stages of the model are defined in the Glossary of Terms (appendix C). Answers to each of these questions suggest different approaches to assessment.

Product Dissemination

The first question of what happened to the product(s) suggests a record keeping approach resulting in a census of all product copies distributed. The rationale for this recommendation is simple: Project directors should be accountable for expenditures of federal funds. Auditors should be able to track the number of copies produced at the public's expense. These records provide a trail leading to persons likely to be prime users of the product(s). A census is also valuable in assessing the proportion of the primary audience reached through distribution of product copies. This statistic is a key in determining whether the problem identified through the needs assessment is being addressed. It may be necessary to use mail surveys to determine whether relevant audiences have received copies of the product.

Product Use

The second question about product use likewise is relevant to evaluation of R&D impact. Credible evidence of product use

must be available to establish causal linkages between the product and changes occurring in vocational education. At the minimum, these linkages must be inferred.

A survey of product recipients, either by mail or telephone, may be used to determine how the R&D product has been used. This is a major commitment of resources; however, it may be necessary to establish the fidelity of product implementation. Data on estimates of cost feasibility, frequency of use, and the degree to which the product has been integrated throughout the organization often provide insights into how the product(s) have been used.

Product Impact

The third question about product effects addresses complex issues of change and program improvement. Baseline data are needed in order to establish changes in a program before and after product use. Rarely is this kind of information available, and comparison groups often cannot be found to serve as a basis for estimating program change. This is why the case study is relied upon as a data collection strategy for assessing impact. Intervening variables can be considered as they influence site-specific conditions.

Of course, case studies represent a narrow focus for impact assessment because they are expensive. A very limited number of studies can be done to gain an understanding of the deeper, more involved issues associated with R&D-based program change. These data supplement results from survey questionnaires and rating

forms. Face-to-face interviews that follow up initial non-directive questions with specific probes based on previous responses often yield worthwhile qualitative data. Such studies require highly trained interviewers who are sensitive to subtle cues.

More needs to be said about the feasibility of using selected techniques for assessing impact. Five major data collection techniques are discussed next.

A record keeping approach may be most appropriate for superficial levels of data collection. Most R&D organizations disseminate outputs (products) from projects to particular user audiences. At least one state has such a listing of an audience (e.g., industrial arts teachers) in a computer data bank; it is possible to print current address labels of these teachers with the press of a button. Almost any state department of education could adopt a "quick and easy" method of recording copies of products disseminated to select audiences. First, however, fundamental information, such as role and organizational affiliations of recipients, should be agreed upon. The categories contained in questions submitted to OVAE in appendix A may be considered a step in this direction.

Evaluators need to know more, however, than just the numbers of product recipients in order to judge the potential impact of R&D products. They also need to know the degree of product use by the recipient. This calls for some type of interactive communication between the evaluator and the product recipient.

At the very least, a mail survey should be used to determine how much use has taken place.

A mail survey, as a technique for assessing impact, can be effective for quantitative answers to predetermined questions. It allows quick and easy tabulation of results associated with standardized variables. A mail survey is least effective when variables need to be clarified or more information is needed to understand the response given. Often, impact data require some knowledge of the context or conditions influencing product use on-site. Often use is not clear cut, or the product has been modified by the recipient to fit the conditions of the school or classroom. The questions in the Product Use Survey (see appendix A) include definitions of potential user categories that may be used to arrive at uniform data. Such questions may also be used with telephone interviews.

A telephone interview adds a new dimension to impact assessments. It allows the evaluator to follow up leads contained in responses by asking related but different questions. These can be very important when determining impact, because often an interviewee does not recognize some activities as product use. For example, sharing a publication with other teachers may be considered use by some teachers but not by others. The telephone interview affords an opportunity for the evaluator to probe for deeper, more meaningful responses to assessment questions.

When telephone interviews are used, it is important for them to be scheduled at a time convenient to the interviewee. This

may be extremely difficult to do, and inappropriate timing of an interview is a major disadvantage of this data collection strategy. Administrators may be caught at busy times, or teachers may not have had time to think about their use of materials during the field test telephone interviews. Scheduling telephone interviews usually requires several advance calls, but it is worth the effort if the interviewee is prepared for the interview.

Face-to-face interviews, as a data collection technique, allow the interviewer to observe nonverbal reactions to the questions. These can be quite helpful in identifying areas for further pursuit of impact. Most often, face-to-face interviews take place on the interviewee's home territory, allowing observation of environmental factors that may influence the use and effects of R&D products. Site visits are expensive, but they represent one of the most complete ways to measure impact.

Baseline measurements are needed to assess long-range impact. This suggests planning and commitment of resources to document existing conditions in advance of introducing the R&D product. Large-scale projects may be able to afford special assessments to establish baseline measurements for the project. Most R&D efforts in vocational education will have to rely on needs assessment data used to identify the problems addressed by the R&D project. Measures taken to identify the problem (e.g., a statewide survey of parents' views on the quality of vocational education) may or may not be representative of conditions at local site(s) where the R&D product has been introduced.

Committing funds for multiyear longitudinal studies also presents a major barrier for most project directors trying to establish baselines.

Criteria for Measuring Impact

Regardless of the strategies or techniques used to collect data, certain criteria must be met to measure impact. The tracer model of R&D impact assumes it is possible to assess impact by looking at preliminary indicators. Thus, the model includes impact criteria at the distribution, use, and effects stages.

Impact criteria from the conceptual framework's dissemination and use stages are presented next. The effects stage criteria, which are clearly different from the other two stages, are discussed in greater detail.

Dissemination Criteria

Strategic dissemination. Cost-effective strategies for disseminating an R&D product should be devised based on characteristics of potential users, site-specific factors, and features of the product itself. Dissemination should be strategic in reaching opinion leaders and influential organizations in the external environment.

Multiple channels. More than one channel for conveying information about innovations should be used. Communication should include mass media (e.g., direct mailing of brochures) and interpersonal channels (e.g., technical assistance). Normally, information duplication and overlap are assets rather than liabilities during the dissemination stage.

Widespread dissemination. Innovations should reach as many potential users as possible. Thus, dissemination to individuals in different roles, in diverse settings, and in many geographic areas should be emphasized. Secondary dissemination through workshops, reprints, libraries, the ERIC system, and so on should be encouraged.

Utilization Criteria

Integrated use. The use of an innovation product should be intensive and pervasive throughout the organization. Accomplishing this task will require drawing on personal commitment within the organization to institutionalize the product and fit it into organizational routines.

Support systems. Support systems necessary for encouraging the full use of an innovation should be operational at the time of implementation. These systems are of three types: personal resources (e.g., administrative endorsement, site personnel endorsement), information resources (e.g., training in the use of support materials and procedures), and physical resources (e.g., dollars, supplies, and equipment).

Time on task. An R&D product should be used frequently enough and long enough for its use to become an integral part of current practice. The audience's time in actually using the product should maximized.

Effects Criteria

Effects criteria are summative, as compared to formative, and some require elapsed time before they can be measured.* Unlike the two previous stages, two of the three criteria in the effects stage deviate from criteria identified in the conceptual framework. They are related to cost-benefits derived from R&D. Policymakers' increased emphasis on productivity and cost savings is noteworthy because of trends limiting resources for vocational education R&D.

Increased productivity, as a criterion for measuring the effects of vocational education R&D, can be applied to either

---

*This is elapsed time between the introduction of an R&D product into a setting and the measurement of changes in that setting resulting from use of the product.

individuals or organizations. It takes the form of increased efficiency, most often in organizations (e.g., the same task can be performed quicker or with fewer persons). Increased efficiency is so common an element in field data that a separate criterion of cost savings is included in the effects category. This criterion of cost savings shows up as time saved in preparing lessons by teachers. Curriculum materials and resource guides are used most often because they save teachers time in the library or in preparing paperwork for class. Occasionally, increased productivity appears as a genuine increase in output, such as an increase in students' test scores. It also takes the form of improved papers completed for class assignments (e.g., more footnotes and references used in the papers).

Measuring R&D impact as outputs of the educational process rather than as improved efficiency of inputs should be a major goal of most evaluation plans. Many barriers to long-range measurement of outputs exist; some, such as longitudinal funding and lack of appropriate experimental field-test design, have already been mentioned. In addition, it becomes very difficult to establish causal linkages between the R&D product use and any increases in productivity measured three or five years later. Many events intervene between the introduction of an R&D product and the long-term measurement of its effects. For these reasons, case studies are recommended as the best strategy for measuring R&D effects.

User satisfaction, the third criterion in the effects stage, addresses an affective dimension of impact measurement; that is,

did the person like the product? This variable, more than the other two, can be manipulated by persons implementing the product. Satisfaction is a function of meeting expectations. Administrators introducing a product have an opportunity to influence expectations either positively or negatively; the level of expectation for product performance developed by product recipients influences their degree of personal satisfaction. User satisfaction may be indicated by product advocacy and/or creative adaptations in use of the product.

Criteria for measuring R&D impact must be uniquely applicable to the project being studied. Criteria should be substantive and site-specific. R&D program evaluators should expect to select criteria to fit the purpose(s) of the evaluation and to use data collection strategies consistent with the resource limitations of the evaluation study.

CHAPTER 3

STRATEGIES FOR IMPLEMENTING THE SYSTEM

The degree of implementation associated with a "continuing and comprehensive" evaluation system of vocational education R&D depends upon answers to several key questions. Among the questions are the following:

- Will the data collected be significant? Will the information obtained from the evaluation system be used to influence key decisions, such as appropriations for R&D projects?
- Can the desired information be obtained? Any data collection will be a compromise between what is possible (given the amount of resources allocated) and what is desired. Will the information obtained be sufficiently compelling to justify the resources expended?
- Can the cost be contained within reasonable limits? What is reasonable for one evaluation inquiry may not be reasonable for another. Relatively limited data are needed to support an audit to determine whether program improvement funds were spent for their intended purpose. Seeking data to support or reject claims of high-quality R&D outputs, for example, will require a much greater expenditure of funds.

The need for a continuing and comprehensive evaluation system is clear. A better system for documenting the effects of R&D activities is possible. Missing is the recommendation for a specific evaluation system.

This chapter contains several implementation strategies discussed within the context of three important questions: (1) should data collection be comprehensive or selective; (2) what is the least-cost alternative for collecting required evaluative information; and (3) do local, state, or national agencies have the responsibility for collecting impact data?

Comprehensive versus Selective Data Collection

Implementing a continuing and comprehensive evaluation system for vocational education R&D does not mean collecting information for all data categories--distribution, use, and effects--or for all products. In fact, the cost of such a system would be prohibitive. Least-cost alternatives associated with the collection of distribution data may use the electronic mailbox or the conventional mail system. Additional costs will be minimal if information collecting and reporting requirements can be incorporated into existing systems. For example, distribution data could be included with abstracts of products delivered to the National Center Clearinghouse.

Although it may be feasible for a project or state to collect distribution data on most products, rarely--if ever--would use data be collected on all products. Costs associated with finding the recipients, asking them questions about product use, and analyzing the results would be prohibitive for all products. Selected studies of products designed to resolve high-priority problems, however, would be feasible. Product recipients could be stratified by some demographic variable important to the evaluation study, such as role and organization. Random samples of recipients could then be taken to determine whether key audiences have not only received the product, but have used it as well. The type of use, as indicated in the questions in appendix A, could provide clues to the likely resolution of the problem. These selected studies of product use might be commissioned by some government agency on an "as needed" basis.

The collection of impact data to measure effects of product use needs to be very selective. Establishing baseline information as a benchmark for judging the effectiveness of R&D in resolving problems requires advance planning; in most cases, it will involve multiyear studies and clear concepts of the goals to be achieved. Unforeseen factors often intervene to delay or diminish the effectiveness of longitudinal evaluations. These factors range from staff changes to cuts in funding. The need for selective information about priority concerns should be the guiding influence on the design and conduct of impact studies.

Alternative Cost Scenarios

The following scenarios were constructed as options for implementing and operating a continuing and comprehensive evaluation system under conditions of scarce resources. Each scenario has a dollar figure attached to it. Cost estimates are difficult to formulate for several reasons.

First, the purpose and use of the evaluation results dictate the conditions of the data collection, such as the degree of confidence to be placed in the data, the size of the sample, and so forth. Sometimes the questions relate to use of products; at other times the investigations revolve around the impact of products.

Second, the type of products and the actual products selected for study included in the assessments affect the selection of respondent audiences and the nature of the dependent measures themselves. For example, a study of information paper

use could easily focus on university classrooms or the number of times the information papers have been quoted by professors. A curriculum product, on the other hand, would be evaluated by teacher acceptance and on its ability to increase students' capabilities. Any given study of R&D impact will be influenced greatly by the particular products chosen for study. A random selection of products produced in a particular theme area could identify different types of products, unless the products were stratified by type. The specific products identified, with their respective lists of product recipients, would determine the size of the population. It could be in the hundreds, or much less.

Third, the method(s) used to collect the data will be determined by the respondent population, sample size, and the amount of resources (i.e., time and money) available to conduct the study. Telephone interviews, for example, take a lot more time than mail questionnaires. Trade-offs in the quality and quantity of data are very real.

These three factors--the purpose of the evaluation study, the actual products selected, and the methods used to collect evaluation data--interact to complicate the formulation of cost estimates. Despite these limitations in estimating costs, several options are proposed in this report for comprehensive evaluation of vocational education R&D. The cost estimates associated with each option are based on the following assumptions:

- Evaluative information about product distribution, use and impact is sequential. Each stage precedes the other, so information about product distribution

is necessary to understand product use. Information about product use is necessary to understand product impact.

- The sampling units and the units of measurement are different for each of the stages. Product distribution samples are based on individual products, but the measurement units are in number of persons receiving the product. Product use, on the other hand, is determined by the different kinds of uses, often quantified by the number of persons involved in that type of use (e.g., members in a class, or the frequency of use by a person). Product impact measures or effects result from actions occurring in the previous two stages (distribution and use). Impact focuses on issues, such as whether the problem has been resolved. The sampling units for impact are likely to be people and organizations in a position to resolve the problem. The measurement units, on the other hand, may be fragments of the problem being resolved. For example, the problem of school dropouts has many dimensions, but one amenable to resolution through vocational education is the abilty of students to acquire employability skills.

  Documenting resolution of the problem may take the form of (1) increased student test scores, (2) increased placement rates, and/or (3) improved average daily attendance figures. The burden of proof for showing problem resolution--or progress towards it--still rests with the project director and the funding agency. The logic of the needs assessment should be used to identify areas of the problem vulnerable to attack. Evaluation data should be provided accordingly. The exact sampling scheme and units of measure are dependent upon the strategy for using R&D products and the people, places, and things affected by the use of these products.

- The number of products evaluated is inversely related to the sequenced stages of distribution, use, and effects. For any given problem to be resolved, distribution data will relate to a greater number of products than use data. Likewise, the expense of collecting effects (impact) data will limit the number of products considered to a lesser number than products evaluated at the use stage.

Within each of these data collection stages--distribution, use, and effects--there are certain minimums to be observed to

ensure the collection of reliable and accurate data. This question of accuracy is addressed in the Request for Clearance document submitted to the sponsor as part of the year one (1983) scope of work. The number of products and the number of respondents at each data collection stage will depend on the level of accuracy desired by the sponsor.

The distribution level proposed in table 1 is a census eliminating the need for a sample. At the use level, it is possible to use relatively small numbers if random selection of both products and product recipients can be achieved. For example, as few as seventy-two respondents are needed per product to ensure accuracy in product use studies under the conditions of random selection of products and random selection of product recipients. Persons making claims for product use under these conditions can be 95 percent confident that the data are at least 90 percent accurate. This level of detail should be left to the design of the specific evaluation study.

A range of costs is provided in table 1 for each option as an aid to planning. The estimated number of products needed to provide credible information for each option is based on the prior experience of the authors. Each scenario describes evaluation activities at the project, state, and national level. Each refers to Programs of National Significance and state-administered program improvement projects.

The scenarios address dissemination/diffusion activities of R&D products. Needs assessment and product development

TABLE 1

OPTIONS FOR COLLECTING R&D PRODUCT IMPACT DATA

Level of Effort Options for Implementing an R&D Evaluation System	Cumulative Cost Estimate[a] (Midrange)	Types of Data Collection		
		Distribution	Use	Effects
1. Product Distribution Census	$49,300	Products: 540 Respondents: 60 Cost: $33,050 - $65,550		
2. Selected Use Studies o 4 Products/ Problem o 75 Respondents/ Product	$120,350	Same as above	Problems: 2 Products: 8 Respondents: 600 Cost: $66,300 - $75,800	
3. Investigative Impact o 10 Sites/ Product o 35 Respondents/ Site	$191,100	Same as above	Same as above	Problems: 1 Products: 1 Respondents: 350 Cost: $63,750 - $77,750

[a]Annual cost estimates to the federal government do not include indirect costs.

evaluations are omitted because these activities should be completed prior to (1) project initiation, or (2) product release.*

The cost estimates of each option are based on the following rates:

Personal ($65,000/study unit)	Budget Rates
o Research specialist	$35,000/FTE
o Graduate research associates	15,000/FTE
o Clerical support	15,000/FTE
Duplication	
o Questionnaires and Reports	.05/page
Postage	.05/ questionnaire
Services (telephone)	400/study
Travel	
o Meetings	700/trip
o Site visits	200/site/ person

These cost estimates do not include payment to respondents for completing the questionnaires or interviews. Also, they do not include indirect costs to the sponsor. The cumulative costs estimates in table 1 subsume the previous options; so the cumulative estimate for option 3, for example, includes activities covered in options 1 and 2. Persons interested in an

---

*Omission of these activities does not mean they are less important; rather it suggests that needs assessment and product development evaluations will need to be completed prior to impact assessment in most cases.

impact study of two products, for example, would multiply the cost estimates times two.

The cost estimates associated with the options in table 1 are cumulative because of the need to know where the products were distributed before the degree of use can be estimated nationwide. Likewise, the extent of any changes discovered through effects studies can be generalized only with knowledge of use patterns. The three stages are linked together for comprehensive and continuing impact assessment. One segment may be implemented in isolation from the others, but a corresponding void in knowledge of the other stages would result.

Scenario No. 1: Product Distribution Audit

The objective of this study is to document the number of significant R&D products produced and distributed to primary user audiences. Program improvement products are those produced from research, exemplary, or development contracts funded in part or in whole with federal dollars. During a recent five-year period (FY 1978-1982) there were nearly 3,994 projects funded at a total level of $104,638,145 (Budke 1983). This amounts to approximately 800 projects per year. Assuming one product per project and a 60 percent response rate, data would be available on approximately 480 state-administered projects.

Records obtained from RCU directors will indicate the number of copies distributed at the time the product was first produced. It will not be possible to determine how many microfiche have been copied from ERIC files or how many times the product was

shared with other professionals. However, the task of collecting this initial data is relatively simple. RCU directors in the states are responsible for their program improvement activities. Experience suggests that they are willing to provide distribution data on products produced from federally funded projects. The average RCU director would invest approximately two and a half hours per year providing these data. In some states, products are distributed by project directors; RCU directors could acquire these records from local project directors in these states and transmit them to a national location, where the records would be summarized.

Programs of National Significance would be summarized on the same type of record form as the ones used for state-administered projects. A listing of the projects and their directors is available from the Projects in Progress file at the National Center Clearinghouse. Project directors would mail their distribution records to either the National Center or the U.S. Office of Vocational and Adult Education. Sixty products came from these programs in 1983.

At least two potential ways exist for reporting product distribution statistics from individual projects. The recommended method is to attach a couple of questions about the role and organization of recipients to the product abstract submitted to the National Center Clearinghouse. This would eliminate the need for a new reporting mechanism. The information would be summarized by the National Center Clearinghouse

staff. The alternative method for reporting the product distribution data would be through the accountability reports completed by each state department of education. These data would be summarized and reported by staff in the Office of Vocational and Adult Education. The unit of measurement would be in number of copies distributed. (See appendix A for the specific distribution measurement questions.)

Scenario No. 2: Selected Use Studies

The objective of these studies is to determine R&D product use. The wide variety of products ranging from information papers to research reports makes the selection of products to study a critical decision in the conduct of use studies. The example used in this option examines utilization of eight products. This immediately suggests a case study approach, with quantitative data collected from surveys of product users. In this example, telephone surveys are used to compute the upper cost estimate, and mailed questionnaires are used for the low estimate.

The eight products could be very different, such as an information paper, a teacher curriculum guide, and a program procedures guide for administrators. Alternatively, the products could be of the same type (e.g., eight different research reports). The selection of products and the degree of inter-relatedness will affect costs. In general, a certain amount of synergism exists when products related to the same problem are studied. For this reason, the general recommendation is to pick

products carefully, preferably ones that are likely to reveal insights into the resolution of a common high-priority problem.

The 600 telephone interviews in this scenario would draw from the questions in appendix A. Numbers of product users are important because they give a sense of quantitative use. Likewise, the length of time used and the amount of depth indicate qualitative use. Impressions of use are gained from the frequency of responses to questions. The types of audiences most affected by the use (e.g., classroom students) can be established from the interviews. Also, a sense of product acceptance or rejection is communicated readily.

The researcher is faced with a difficult task in reporting this information. How does one communicate impressions? Both qualitative indicators and quantitative data can be used to support logical but tentative conclusions from these observations. Quotations can be used to portray representative beliefs and opinions. Tables are appropriate for comparing number of users, for example, in different types of settings.

Reports of these selected use studies are likely to be highly focused on one or two important questions, such as whether products are being used by teachers to improve instruction provided to vocational students. The results convey <u>what</u> is happening in a community, state, or nation, but not what difference the products make. Some indications of what respondents <u>think</u> might happen as a result of use can be obtained. This information is speculative unless the survey is done some time after the product was introduced.

These surveys also provide an opportunity to gain impressions about the quality of the product. Results from users can be combined with evidence from product developers to arrive at a considered judgment of quality. This is also an opportune time to obtain feedback on dissemination methods and to solicit suggestions for improving the delivery of R&D products. This kind of information does not by itself indicate product use, but the suggestions for improvement, if implemented, could add to the cumulative impact of future R&D products disseminated.

Selected product use studies could be conducted by a variety of agencies, including the National Center, third-party evaluators, or staff at the U.S. Office of Vocational and Adult Education.

Scenario No. 3: Investigative Impact

The third option indicated in table 1 is labeled "investigative impact." Even with the establishment of an evaluation system for collection of data, impact will always be elusive. The objective of this study is to determine whether R&D product use makes any difference. To a degree, every impact study is an open-ended investigation. Leads are uncovered enroute to documenting changes. These ought to be pursued if (1) they are relevant to the study and (2) time and resources permit.

The impact option in the table 1 matrix examines the use of one product in each of ten sites. On-site interviews of product users and others are suggested for the following reasons:

- Important nonverbal cues can be obtained in face-to-face interviews.
- Factors influencing impact, either positively or negatively, can be observed.
- Economics of data collection can be obtained by interviewing several people at the same site. This also helps to gain alternative views of what happened.
- More than one person can be interviewed at the same time, thus allowing confirmation or rejection of information provided.
- More than one interviewer can be taken to a site, thus allowing comparisons of notes and interactive planning.
- It is easier to establish baselines for a site than for a group of sites, or for an entire state. Many details "wash out" in group comparison data.

Reasons for interviewing people in their home environment vary but, in general, first-hand knowledge of situations helps to analyze and interpret impact measures.

Measures of product effects will be quite different for different kinds of products. For example, the impact of an information paper may be measured by the number of times the paper is cited in subsequent research or in policy decisions. Indicators of curriculum changes, on the other hand, may be found in the growth of students' knowledge in the substantive area of the materials. The substance of the program improvement is very important in the measurement of impact. Growth in a student's ability to learn to weld, for example, would be measured quite differently than growth in a student's ability to cook. Indicators of impact should be established for each substantive

area. Look for individual growth, organizational change, and effects on the community.

This cannot be done without documenting the individual's or organization's performance level at the time the R&D product was introduced. Achievement tests, records of organizational productivity, and so forth are very important as baseline measurements of change. In the absence of such records, investigators must piece together fragments of evidence indicating how the individual or organization "used to function." This can be done by asking questions about changes that have taken place, or by describing conditions prior to the introduction of the product. But this information is less satisfactory than an independent measure of performance at a prior point in time. Of course, the ideal situation--and one that ought to be followed in matters where large sums of resources have been invested--is to construct the baseline measurement in advance of introducing the product. Rarely does this happen, but the frequency is increasing as agencies become more interested in obtaining information on R&D product impact.

This information would be reported in much the same manner as the product use information. Special reports would be provided to the sponsor by the contractor. The contractor could be an independent agency, the National Center, or the U.S. Office of Vocational and Adult Education.

Utilization of Impact Evaluation Results

Once data have been collected, what should be done with the results of an impact assessment? How will the evaluation make a difference in R&D programming?

At the needs assessment stage, conduct of an evaluation can help ensure rational, data-based decision making. It's difficult to prioritize needs under the best of conditions. A formal needs assessment can systematically collect information on diverse needs. This procedure should help administrators think through logical consequences of funding decisions, including who should receive research products and what changes can be expected if they use them.

Evaluation of R&D products as they are being developed is essential for high quality products. Product use data from field test sites can reveal worthwhile information on such variables as teacher acceptance of the innovation, student growth, and ease of use. Reviews of products for biases, such as occupational stereotyping, can prevent inadvertent dissemination of undesirable ideas. Non-release of poor quality R&D products should be a viable option for program administrators. Quality control is an important function of the model's product development stage.

An assessment of product distribution can tell a decision maker if the right people are receiving the R&D results. Sometimes people on the distribution list are not in a position to use the materials. An awareness leaflet describing the product may be more appropriate than sending them the entire

product. Often, groups of professionals find uses for products not anticipated by developers. A program administrator should view product distribution lists as dynamic changing, entities.

Product use should be evaluated periodically to determine if R&D results are being used by the intended audience. Circumstances sometimes prevent full acceptance of materials, e.g., the teacher may not know how to present the information or funds may not be available to purchase supplies essential to the use of the product. R&D program managers should conduct evaluations to determine if appropriate materials are being used to overcome high priority problems in vocational education.

Assessment of product impact is more difficult than the other types of evaluations, but it promises to pay big dividends in several ways. First, an impact assessment can tell a decision maker whether practice in vocational education classrooms is any different as a result of using R&D products. A problem does not have to be completely resolved to have been influenced by the R&D. For example, a recent impact study of entrepreneurship materials (Hull 1983) showed some progress being made in infusing entrepreneurship materials into classrooms. In one instance, a separate course on starting one's own business was becoming institutionalized as a result of using the R&D products being studied. These "readings" on state-of-the-art practice in the field serve not only as an indication of what has changed, but also as a baseline measure for planning the future.

The second difference that impact assessment can make in R&D programming is related to baseline measurement. Impact studies can provide a kind of needs assessment to determine whether more work ought to be done in a problem area. If the site visits conducted during the impact study of entrepreneurship education reveal positive effects on students, for example, a state department of education may want to consider mounting a statewide program in this area. Impact assessments can therefore help in establishing priorities for the future.

Third, impact assessments can serve as a summative evaluation of dissemination/diffusion processes. User audiences may be missed during the distribution of R&D products, teachers may leave products on the shelf following an initial "bandwagon-style" introduction of a product into a school, or resources may not have been available for full implementation of the new idea. Such problems often surface during an impact assessment. Program improvement processes in vocational education can be upgraded if investigators are familiar with the processes and are willing to analyze data with these processes in mind.

There are many obstacles to conducting successful impact studies. The studies are expensive, longitudinal investigations require advance planning, and results may reflect unfavorably on persons responsible for program improvement, thereby creating potential problems for utilization of results. But the logic of assessment as a means of accountability in vocational education R&D is compelling. Wise administrators at the local, state, or

national level will take steps to implement impact assessments in a manner consistent with the time and cost constraints of their situation.

Local, State, and National Partnerships

The successful implementation of a vocational education R&D evaluation system will require the cooperation of all levels of government. Local project directors will need to comply with requests for distribution data and, on occasion, development data. State research administrators must take care to outline expectations for impact in Requests for Proposals.

State education departments represent a vital link in the network of vocational education R&D. They not only sponsor research, but they must also interpret and use its results to advance education's interests. In addition, state agencies play an important role in providing accountability data to the federal government. Organizations such as the National Center and the regional curriculum centers provide expertise and technical assistance to states, the federal government, and to local projects on an "as needed" basis. Their activities should make the entire program improvement process in vocational education operate more effectively.

The question of who should conduct the product distribution, use, and impact assessments is an important question. Clearly, distribution data should be collected through routine channels and summarized with the least disruption possible. Knowing the number of copies distributed from R&D projects is important

information. The National Center and/or the U.S. Office of Vocational and Adult Education is in the best position to conduct and summarize these data.

Utilization and impact studies differ greatly from dissemination data collection requirements. Use and impact studies should be conducted as the need arises, but the funds always will be limited. It is not likely that the U.S. Office of Vocational and Adult Education will want to invest valuable staff time in conducting these studies. The National Center would have a comparative advantage for conducting these studies, because of the relationships it has established with state departments of education and with local education agencies. The National Center has also established an excellent track record in delivering high-quality studies. The greatest amount of credibility would come from an independent third-party investigation of product impact on high priority questions. In any event, agreement on the area(s) to study must be reached in advance of funding, and that agreement must include standards for judging the performance of R&D projects and products.

This report has addressed a number of significant questions associated with the conduct of vocational education R&D impact studies. More questions have been raised than answered, but the possibility of improving on our current state of data collection seems likely. Systematic collection of distribution data, selected studies of product utilization, and investigations of product impact offer the promise of empirical observations to

justify or deny the tremendous dollar investments being made in the vocational education R&D enterprise in this country. We should not hesitiate to move forward in this quest for an effective evalution system.

CHAPTER 4

SUMMARY

This report contains a brief review of vocational education R&D legislative authorizations. Federal and state dollars are being invested in research and development (including curriculum development) to improve vocational education programs, but evidence of impact has been scant. Individuals tend to adapt R&D products during use, and often the effects of use are embedded in organizational routines. So it is difficult to attribute causal changes in students and organizations to the use of R&D products. What is needed is an evaluation system that provides essential information on product distribution, use, and effects to relevant decision makers for planning and accountability purposes.

The objective of this study was to design a simple and relatively low-cost evaluation system for judging the impact of R&D products and information. The system is to use available data whenever possible; take advantage of existing reporting mechanisms; and assess the effectiveness of R&D at the local, state, and federal levels.

The methodology of this study relied on telephone interviews with product users, off-the-shelf records of product distribution, and on-site interviews to gather data on R&D impact. These data are reported in a companion document entitled Summary of Dissemination Outcomes (Hull 1983). Estimates of RCU capabilities and those of other agencies in vocational education to evaluate R&D activities are based on these data. The next

sections present conclusions and recommendations regarding the readiness of government agencies to assume the data collection burden of a comprehensive and continuing evaluation system.

Conclusions

The results of the study lead to the following conclusions:

- On-the-shelf distribution data exist and can be accessed through relatively low-cost record keeping procedures.
- Most RCU directors are willing and able to provide distribution data on the R&D products they distribute.
- Most states are not organized to provide product distribution data by standardized categories.
- Data on use of R&D products are more difficult to obtain than distribution data.
- Superficial data on product use may be obtained by mail, but documenting the degree of product use in detail usually requires interview and observation data.
- Baseline measures of some type must be established when assessing product impact.
- Interactive methods (e.g., telephone and face-to-face interviews) are necessary for collecting impact data under most conditions.
- Data on product use and impact are collected by very few states at the present time.

Recommendations

Based on the conclusions of the study, the following recommendations are offered for establishing a vocational education R&D comprehensive evaluation system:

- A comprehensive and continuing R&D product evaluation system should be implemented in phases, beginning with the collection of distribution data.

- Studies of product use should be targeted to specific samples of product recipients.

- Impact studies of the effects of product use should be funded for high priority needs only. Enough money should be available to the project for the collection of baseline data.

- Studies aimed at establishing general standards for evaluating dissemination strategies, utilization approaches, and effects of product use need to be conducted. General classes of standards for evaluating these activities can be used as a model for deriving specific standards for projects.

APPENDIX A

SURVEY INSTRUMENTS

TABLE A-1

SUMMARY OF INSTRUMENT USE

Type of Instrument	Respondent Population	Appropriate Number of Respondents	Total Number of Burden Hours
Development Survey	Product Developers and Sponsors	*	*
Distribution Survey	Product Developers and Distributors	50	133
Use Survey	Product Recipients	15,000	5,000

*The development survey will be used to supplement the information from the distribution survey only when there is special interest in a particular product. It would be administered to one or two respondents per product and would take twenty minutes to complete.

Tear Sheet for Telephone Interviews

Survey No.

Product Development/Dissemination
Interview Schedule

Telephone _____ Interview Date _____

Respondent _____ Product Id. _____

Role _____ Product Type _____

Organization _____

City/State _____

Form Approved
FEDAC No. _____
App. Exp. _____

R&D Product Development Survey

Survey No. _____

The National Center for Research in Vocational Education at The Ohio State University is conducting a study to determine the use of selected research and development products. This survey concerns the product identified in the enclosed description. Please complete the questions about this product by either circling the appropriate response or filling in the blank space provided. Your voluntary participation is appreciated.

1. Was a written needs assessment completed prior to the decision to develop this product?

   ☐ Yes
   ☐ No

2. Are objectives for product use clearly stated early in the product?

   ☐ Yes
   ☐ No

3. Were primary target audiences identified prior to development of the product?

   ☐ Yes
   ☐ No

   If yes, who are they? _____

   _____

4. Were computerized databases searched (especially Research in Vocational Education) prior to product development?

   ☐ Yes
   ☐ No

   Was other literature reviewed?

   ☐ Yes
   ☐ No

   If yes, list sources (e.g., Dissertation Abstracts) _____

   _____

   Number of citations used in developing product _____

5. Who developed the product? (Number of people by role and organization)

Organization	Role				
	Role	Administrator	Teacher	Student	Other
Education Organizations					
State education agencies					
Secondary schools, including districtwide audiences					
Two-year community/ technical institutes, proprietary schools, and programs for adults					
Universities and other four-year institutions					
Other Public Organizations					
Military, correctional institutions, rehabilitation services, CETA/JTPA programs, and community-based organizations such as industry opportunity centers					
Other Private Sector Organizations					
Business, industry, and labor councils					

6. Was the product revised?

☐ Yes

☐ No

How many revision cycles? _____

How many people provided feedback for revisions? _____

7. What evidence do you have that the product is of high quality?

_____

_____

_____

8. Are estimated costs of product implementation available?

☐ Yes

☐ No

If yes, how did you arrive at them? _____

_____

9. How would you rate the product on the following indicators of quality:

	Unacceptable	Low Quality			Very High Quality	No Information
Scholarship	1	2	3	4	5	9
Usefulness	1	2	3	4	5	9
Equity	1	2	3	4	5	9
Communicability	1	2	3	4	5	9
Marketability	1	2	3	4	5	9
Overall Quality	1	2	3	4	5	9

10. How many copies (total) have been disseminated since the product was released? _____ Date of initial release _____

11. Where did the copies go?

Organization	Role	Role: Administrator	Role: Teacher	Role: Student	Role: Other
Education Organizations					
State education agencies					
Secondary schools, including districtwide audiences					
Two-year community/ technical institutes, proprietary schools, and programs for adults					
Universities and other four-year institutions					
Other Public Organizations					
Military, correctional institutions, rehabilitation services, CETA/JTPA programs, and community-based organizations such as industry opportunity centers					
Other Private Sector Organizations					
Business, industry, and labor councils					

12. What were the primary means of product dissemination? How many copies were distributed by each means?

	Number of copies
☐ Direct mail	_____
☐ Conferences and workshops	_____
☐ Resource centers	_____
☐ Technical assistance	_____
☐ Commercial publishers	_____
☐ Development site	_____
TOTAL	_____

13. Did you encounter any unusual circumstances in the distribution of this product that may have enhanced or inhibited its use by recipients?

Thank you for your help! Please return this completed survey in the enclosed self-addressed stamped envelope.

Form Approved
FEDAC No. _____
App. Exp. _____

R&D PRODUCT DISTRIBUTION SURVEY

Date this record was completed _____

Product Title _____

Author _____ Publication Date _____

INSTRUCTIONS: Please complete this information and attach it to the product when the product is submitted for inclusion in the ERIC Clearinghouse database. These records document the initial distribution of copies immendiately following publication release. Thank you for voluntarily sharing this information.

1. Type of Report:

   1. ☐ Research Report (Primary research including evaluations)
   2. ☐ Resource Guide/Directories/Bibliographies/Literature Review
   3. ☐ Policy or Position Paper
   4. ☐ Handbook/Procedural Guide
   5. ☐ Teacher Guides
   6. ☐ Student Material

2. Substantive Focus:

   01 Vocational Education Service Area
   02 Economic Development
   03 Technology
   04 Business/Industry Training
   05 Linkages
   06 Special Populations
   07 Curriculum and Instruction
   08 Equity
   09 Career Development
   10 Fundamental Skills
   11 Adult Training/Education
   12 General Information
   13 Other program improvement processes, such as evaluation, follow-up, management, administration, and planning

3. When was the product released? _____ _____

4. How many copies of this product were distributed during the remaining months of the calendar year after the product was released? _____

5. To whom were these copies distributed?

Role / Organization	Total	Number of Copies		
		Administrative, Professional, and Support Personnel	Teachers/ Trainers	Students/ Trainees
Education Organizations				
State education agencies				
Secondary schools, including districtwide audiences				
Two-year community/technical institutes, proprietary schools, and programs for adults				
Universities and other four-year institutions				
Other Public Organizations				
Military, correctional institutions, rehabilitation services, CETA/JTPA programs, and community-based organizations such as industry opportunity centers				
Other Private Sector Organizations				
Business, industry, and labor councils				
Total				

6. In addition to the copies indicated above, how many copies were sent to the following:

_____ Persons at the national or regional level

_____ Persons in other countries

7. Which of the following methods were used to distribute the product? (Check all that apply.)

- ☐ 1. Direct mail
- ☐ 2. Workshops or meetings
- ☐ 3. Personal contact
- ☐ 4. Development centers
- ☐ 5. Libraries, resource centers
- ☐ 6. Commercial publishers

Tear sheet for telephone interviews

Telephone Survey Identification
(to be discarded following interview)

Survey No. _____

Telephone _____ Interview Date _____

Recipient Id. _____ Product Id. _____

Role _____ Interviewer _____

Organization _____

City/State _____

Form Approved
FEDAC No. _____
App. Exp. _____

R&D PRODUCT USE SURVEY

Survey No. _____

The National Center for Research in Vocational Education at The Ohio State University is conducting a study to determine the use of selected research and development products. This survey concerns the product identified in the enclosed description. Please complete the questions about this product by either circling the appropriate response or filling in the blank space provided. Your voluntary participation is appreciated.

1. Do you remember the product? ☐ Yes ☐ No (If no, answer no further questions and return the forms.)

2. Date the product was received _____

3. Were you involved in the product's development (write, test, review, etc.)?

   ☐ Yes ☐ No

4. How did you learn about the product? (Check all that apply)

   ☐ Brochure, flyer
   ☐ Announcements, articles in newsletters or periodicals
   ☐ Displays at conventions
   ☐ Workshops, conferences
   ☐ Personal contact
   ☐ Contact with a development site
   ☐ Technical assistance
   ☐ Through an information network

5. How did you receive this product?

   ☐ My supervisor gave it to me.
   ☐ It was in the file.
   ☐ It was sent unsolicited in the mail.
   ☐ I ordered it. (What motivated you to order this product?)_____

   _____

6. Have you used any of the ideas contained in the product?
   If not, skip to question 10.

   ☐ Yes
   ☐ No

7. How have you used the product? (Check all that apply.)

- ☐ 1 Read, reviewed, or studied it
- ☐ 2 Referenced or quoted from it
- ☐ 3 Improved instruction or other curricular/counseling activities
- ☐ 4 Planned or conducted research
- ☐ 5 Influenced planning or policy decisions
- ☐ 6 Effected changes in the organization
- ☐ 7 Placed in a library or resource center
- ☐ 8 Shared the product for other's use
- ☐ 9 No use. (Why was the product not used?)

_____

_____

8. If you shared the product or the information in it with others, who were they, and what type of use took place?

Write the number of users annually in each cell

(Check the type of use.)	Administrator[a]	Teacher[b]	Student[c]	Other[d]
☐ 1 Used in an instructional setting (class, workshop, etc.) How many hours of instruction annually related directly to this product?				
☐ 2 Used in a noninstructional way to improve programs or the organization.				
☐ 3 Shared informally with colleges for their own personal use.				

a. Include superintendents, principals, coordinators, supervisors, etc.

b. Include instructors, professors, student teachers, etc.

c. Include all learners (e.g., teachers in an in-service workshop).

d. Include parents, board members, advisory groups, counselors, etc.

9. What plans do you have for future use of the product?

_____

_____

Stop. This completes the questionnaire if use has not taken place. Please return your comments in the self-addressed stamped envelope. If use has taken place, go on to the next question.

10. If you used the product, was it modified in some way?

- ☐ Yes
- ☐ No

11. What was the degree of modification?

Very Little — Very Great

☐1——☐2——☐3——☐4——☐5

12. How many copies of the product were reprinted _____? Ordered _____?

13. Did you receive any support within or outside of the organization to help use the product?

- ☐ Yes
- ☐ No

(If yes, check all that apply:)

- ☐ 1 Training
- ☐ 2 Technical assistance
- ☐ 3 Administrative support
- ☐ 4 Financial support
- ☐ 5 Release time
- ☐ 6 Access to needed supplies, equipment, and space
- ☐ 7 Other _____

14. Did you need support?

- ☐ Yes
- ☐ No

15. Was the level of support adequate?

- ☐ Yes
- ☐ No

16. Estimate the annual costs to you or your organization to use this product. (Respond to all that apply.)

- ☐ 1 Purchase price of the product ($ _____)
- ☐ 2 Teacher preparation time (estimated number of hours _____)
- ☐ 3 Other training costs ($ _____)
- ☐ 4 Annual costs for supplies, equipment, space ($ _____)

17. How would you rate the product on the following criteria?

	Poor	Fair	Good	Very Good	Excellent
1. Relevance (meets an implicit or explicit need)	1	2	3	4	5
2. Utility (can be used by you or others)	1	2	3	4	5
3. Contribution to knowledge (in the profession or to you personally)	1	2	3	4	5
4. Scholarship (accurate and reliable content)	1	2	3	4	5
5. Value in relation to cost	1	2	3	4	5
6. Editorial quality	1	2	3	4	5

18. Compared to similar products, rate this product on overall quality. 1 2 3 4 5

19. How could this product or its delivery to you have been improved?

_____

_____

20. Describe changes resulting from the use of this product in the following areas:

1. Your personal knowledge or skills _____

_____

2. Use of time _____

_____

3. Student learning _____

_____

4. Organizational efficiency _____

_____

5. Equity for special populations (e.g., the handicapped, minorities, women)

_____

_____

6. Business and industry _____

_____

A MORE COMPLETE DESCRIPTION CAN BE WRITTEN ON THE REVERSE SIDE OF THIS PAPER.

21. Estimate the annual amounts of money or time saved as a result of using this product.

$ _____ _____ hours.

What is the basis for these estimates? _____

_____

_____

22. What are the chances that use of this product can improve vocational education over time?

Not Likely				Very Likely	Don't Know
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 9

Thank you for your help! Please return this completed survey in the enclosed self-addressed stamped envelope.

APPENDIX B

A CONCEPTUAL FRAMEWORK FOR ASSESSING IMPACT

A CONCEPTUAL FRAMEWORK FOR ASSESSING IMPACT

There are many diverse organizations in vocational education that produce research and development products for use in the field. These include curriculum centers in state departments, the National Center, and state universities, among others. Figure B-1 displays relationships among these organizations in the production, distribution, use, and impact of R&D products. Federal funds flow from the U.S. Office of Vocational and Adult Education to states for program improvement. Often these federal funds are matched with state or local dollars. The types of projects actually conducted in these fifty different funding points vary greatly, depending on the amount of money available and the research needs of that particular state.

An average of $380,502 was allocated for research, demonstration of exemplary products, and curriculum development by each state per year (FY 1978-1982), according to Budke (1983). A great deal of R&D variance is noted among the states, with larger states averaging $2,637,507 and smaller states averaging $48,589 for a comparable time period.

Vocational education R&D results in diverse types of products, as exemplified by the following:

- Research and evaluation reports
- Review and synthesis of research, including secondary analysis
- Policy papers
- Position papers

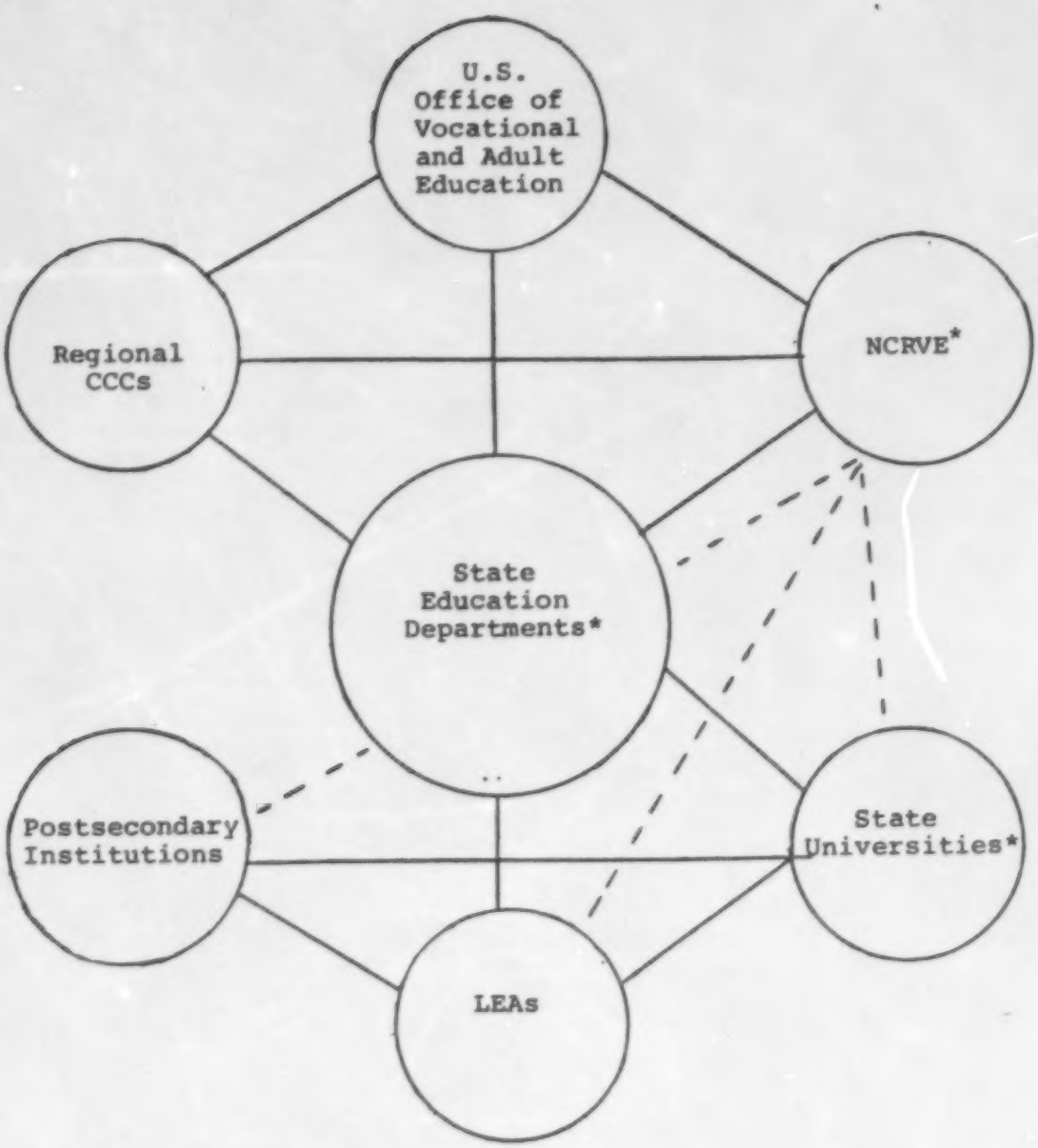

Figure B-1. Interface relationships among institutions concerned with quality and utility of vocational education R&D

*Indicates major producers of R&D products

- o Resource guides, directories, and bibliographies
- o Handbooks and procedural guides
- o Teaching outlines and training packages
- o Student learning materials

Expectations for product impact depend on the substantive nature of the document, the reasons for its use, and the particular setting in which it is used. This diversity of actors and products raises concerns about technical problems in aggregating evaluative data across highly variable conditions. As in the Vocational Education Study (1981), variability among procedures used to secure placement data raises questions about the validity and comparability of local and state aggregations. What is needed is an R&D product evaluation system that focuses on essential information for planning and accountability purposes. The system should be relatively simple and low-cost, using existing organizations and relationships whenever possible.

As an aid in organizing ideas about impact, a conceptual framework is depicted in figure B-2. It contains salient features of impact producing processes. These features are grounded in change process literature, and particular attention is focused on change as a result of using new ideas from R&D projects. This conceptualization assumes that (1) new ideas can be packaged in a transportable format for use in diverse settings and (2) R&D products can be used by persons not involved in their development. Cost reduction efficiencies are envisioned by

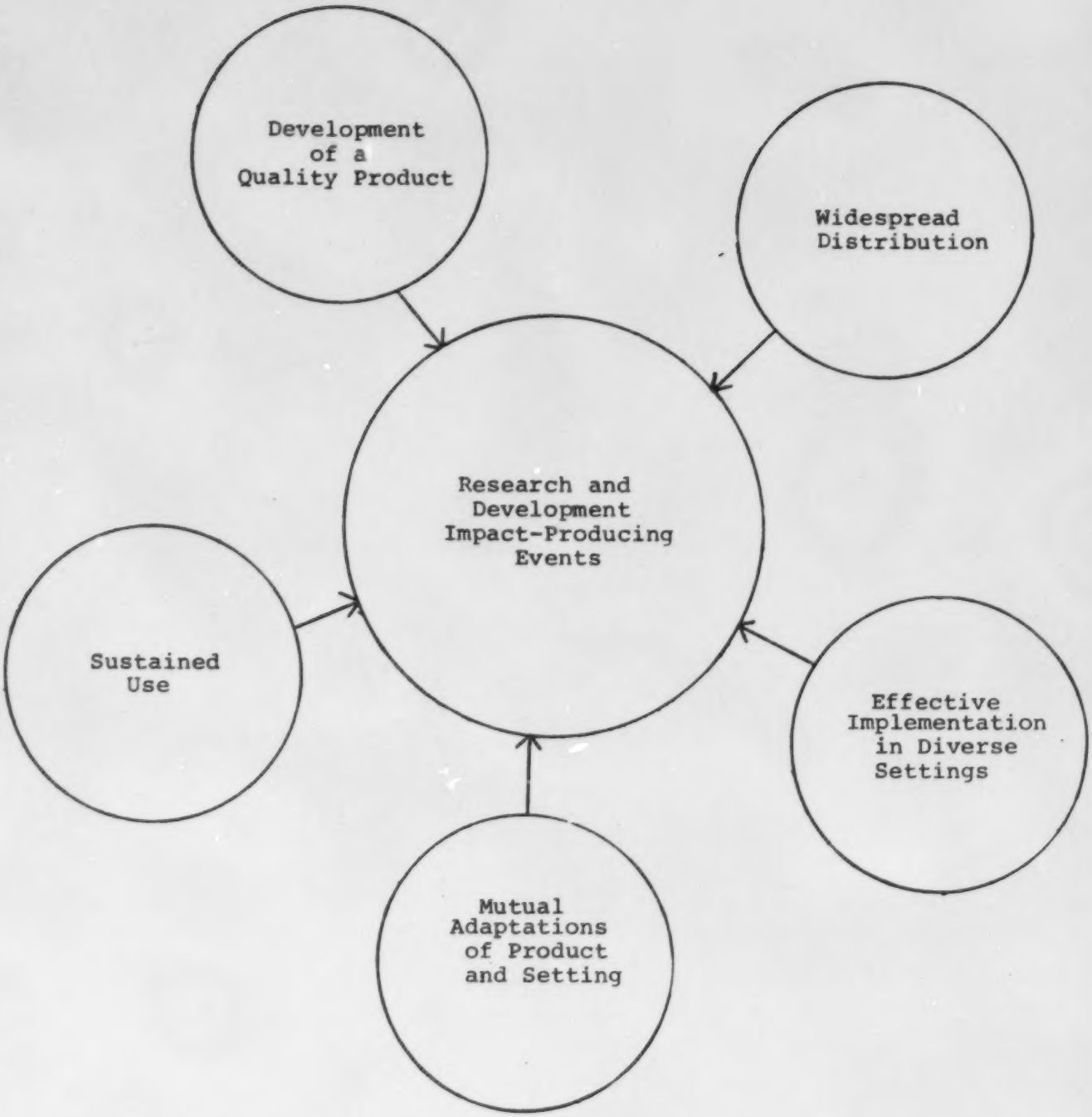
Development of a Quality Product
Widespread Distribution
Research and Development Impact-Producing Events
Sustained Use
Effective Implementation in Diverse Settings
Mutual Adaptations of Product and Setting

Figure B-2. Conceptual framework

sharing high-quality products with others, thereby avoiding "rediscovery of the wheel."

The conceptual framework specifies impact-producing processes. Activities and events are believed to be cumulative in effecting change based on the use of R&D products. The framework in figure B-2 highlights critical processes associated with impact. The processes are somewhat sequential in nature (e.g., implementation of a product following distribution), but there is also a sense of recycling within each process. For example, secondary distribution of a product may occur when recipients share it with other individuals. Effecting change in vocational education using R&D products may also be influenced by unforeseen factors. For example, a budget crisis may intervene to disrupt the smooth implementation of an R&D product in a school setting. What follows is a brief discussion of concepts in the framework. The remarks are based on information from the literature and experience in collecting impact data.

Paramount among these concepts is the development of a high quality product. A three-year study (Louis, Rosenblum, and Molitor 1981) of the National Institute of Education's research and development utilization program found product quality to be particularly important in predicting the degree of problem resolution. Product quality is considered a measure of the relevance of the product to the situation and the degree to which it is a genuinely new way of doing things. These measures, taken at fifty-one sites during 1978 to 1980, used focused unstructured interviews and included approximately 100 products or sets

of materials. The National Center's Advisory Council reviewed criteria in the evaluation model proposed in this paper and rated the development criteria at the very top of the list.

Quality control of R&D products is difficult to achieve, however, and even more difficult to have accepted in the field as an important indicator of potential impact. As Klein (1978) points out:

> . . .users are not systematic in their approach, and seldom use effectiveness criteria. My experience working with user groups, such as teachers, supports the notion that the users feel very unqualified to look at even summary reports on evaluation. (P. 119)

Quality control of R&D products is an uphill battle for developers. Money is scarce, and some people assume that money allocated for product production automatically results in a good product. What is needed is more evaluations of products while they are being developed, with clear indicators of what the products can do for potential users. The great need for quality standards is documented in the Committee on Vocational Education Research and Development (1976) report and has been emphasized more recently by Worthington (1981). A comprehensive evaluation system must give attention to the development of standards for quality control.

Widespread distribution of R&D products is implicit in the concept of comprehensive dissemination, as defined by the Dissemination Analysis Group (DAG) (1976). DAG's four-level definition of dissemination (i.e., spread, exchange, choice, and implementation) has been endorsed by professionals in the field

of educational dissemination at the June 1977 Dissemination Forum.

The DAG conceptual definition of comprehensive dissemination forms an underlying rationale for comprehensive impact, as captured in the conceptual framework in figure B-2. The first-level definition of spread resembles a one-way casting out of knowledge similar to the idea of widespread dissemination used in the impact conceptual framework. Impact does not take place in a vacuum. Antecedent conditions and concurrent factors, such as opportunity costs of resources used, influence the likelihood of impact from R&D products. What are some of these conditions? What are the requirements for effective program improvement as a result of R&D product use? Answers to these questions will be uncovered as more and more impact studies are conducted.

Another concept relating to impact from R&D products is effective implementation of the product in diverse educational settings. Some people subscribe to the view that good products will sell themselves. But product developers do not always know how products will be used. As articulated in the DAG (1976) report, products are selected by users for program improvement interventions. R&D products must be accompanied by support systems that involve physical and financial resource allocations. Product implementation and use must be endorsed by those in authority for institutionalization to occur.

Fullan and Pomfret (1977), in their review of curriculum implementation studies, identify several factors influencing effective implementation.

Among them are the following:

- Characteristics of the innovation, such as its complexity or difficulty of change required by the innovation
- Strategies of implementation dealing with resource support, timing of the intervention, feedback mechanisms, and participation in the innovation process
- Characteristics of the adopting units, such as their demographics and ability to solve problems
- Macro-sociopolitical factors, such as incentive systems, the role of evaluation, and political complexity

In an insightful article on incentives for innovation in the public schools, Pincus (1974) reviews bureaucratic factors supporting innovation and characteristics of institutional settings. He concludes by saying:

> . . .in a diverse society. . .at any one time there will be a variety of standards. A major focus of R&D policy should be. . .experimentation and. . .incentives that encourage new patterns of institutional behavior. (p. 139)

The possibility of an R&D product being modified in the process of becoming adopted by an institution is always very great. The Rand Corporation (Berman and McLaughlin 1978) conducted a study that included the Part D Exemplary Programs authorized by the Vocational Education Amendments of 1968. The study showed effective projects to be characterized by <u>mutual adaptation</u> of both the product and the adoption site during the implementation process. The study also found professionalism to be a primary motivation when teachers undertake extra work. Clarity of objectives likewise had a major effect on implementation. In addition, comprehensive projects were found

to be no more effectively implemented than simple projects; in fact they were somewhat less likely to produce teacher change. These findings suggest the value of incremental goal setting when introducing an R&D product into an established educational setting.

Another concept related to impact from R&D products is sustained use of the R&D product. Causal models constructed by Crandall et al. (1982) to explain findings from a sample of 146 schools in ten states show that teacher commitment and elapsed time (i.e., the length of time the teacher has been using the innovation) are significant predictors of change in practice. The centrality and importance of teacher commitment or ownership are underscored by consistent patterns in subsets of the data. Organizational change, on the other hand, reflects the importance of the principal's management style and leadership. The principal's ability to adopt a "take charge" attitude provides the only route to institutionalization of R&D-based innovations.

What figure B-2 does not show is the time frame necessary for changes to be brought about by the use of R&D products. Figure B-3 places the factors affecting impact in a linear sequence. Types of evaluation activities are indicated, including needs assessment, which has been added as a basis for judging the effectiveness of the impact. Two important considerations in the evaluative process are indicated in the figure as decision processes. They are (1) the decision to release a product and (2) elapsed time between introduction of a product to a setting and evaluation of that setting for product impact.

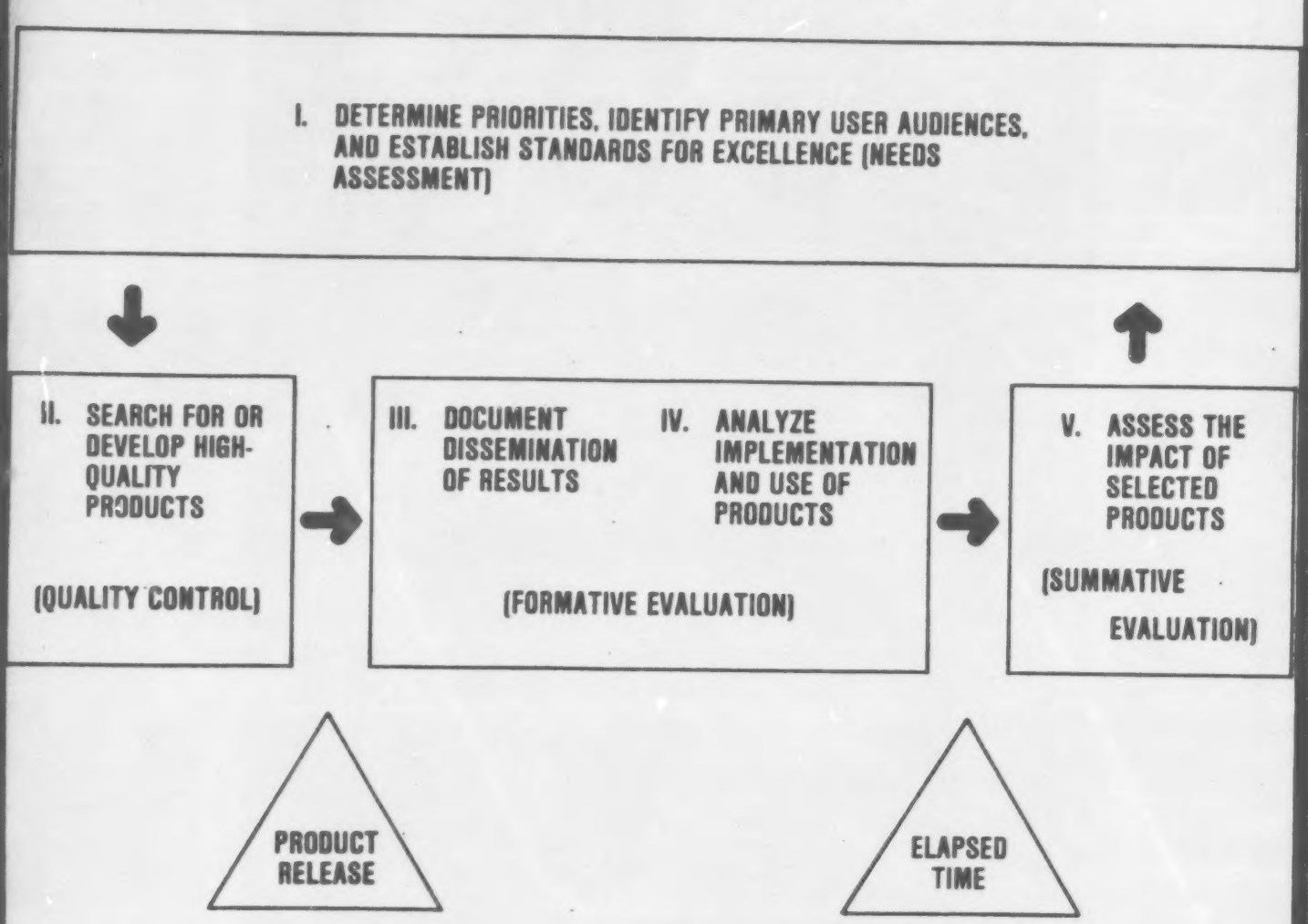
I. DETERMINE PRIORITIES, IDENTIFY PRIMARY USER AUDIENCES, AND ESTABLISH STANDARDS FOR EXCELLENCE (NEEDS ASSESSMENT)
II. SEARCH FOR OR DEVELOP HIGH-QUALITY PRODUCTS
(QUALITY CONTROL)
III. DOCUMENT DISSEMINATION OF RESULTS
IV. ANALYZE IMPLEMENTATION AND USE OF PRODUCTS
(FORMATIVE EVALUATION)
V. ASSESS THE IMPACT OF SELECTED PRODUCTS
(SUMMATIVE EVALUATION)
PRODUCT RELEASE
ELAPSED TIME

Figure B-3. Linear Sequence for Evaluation Activities

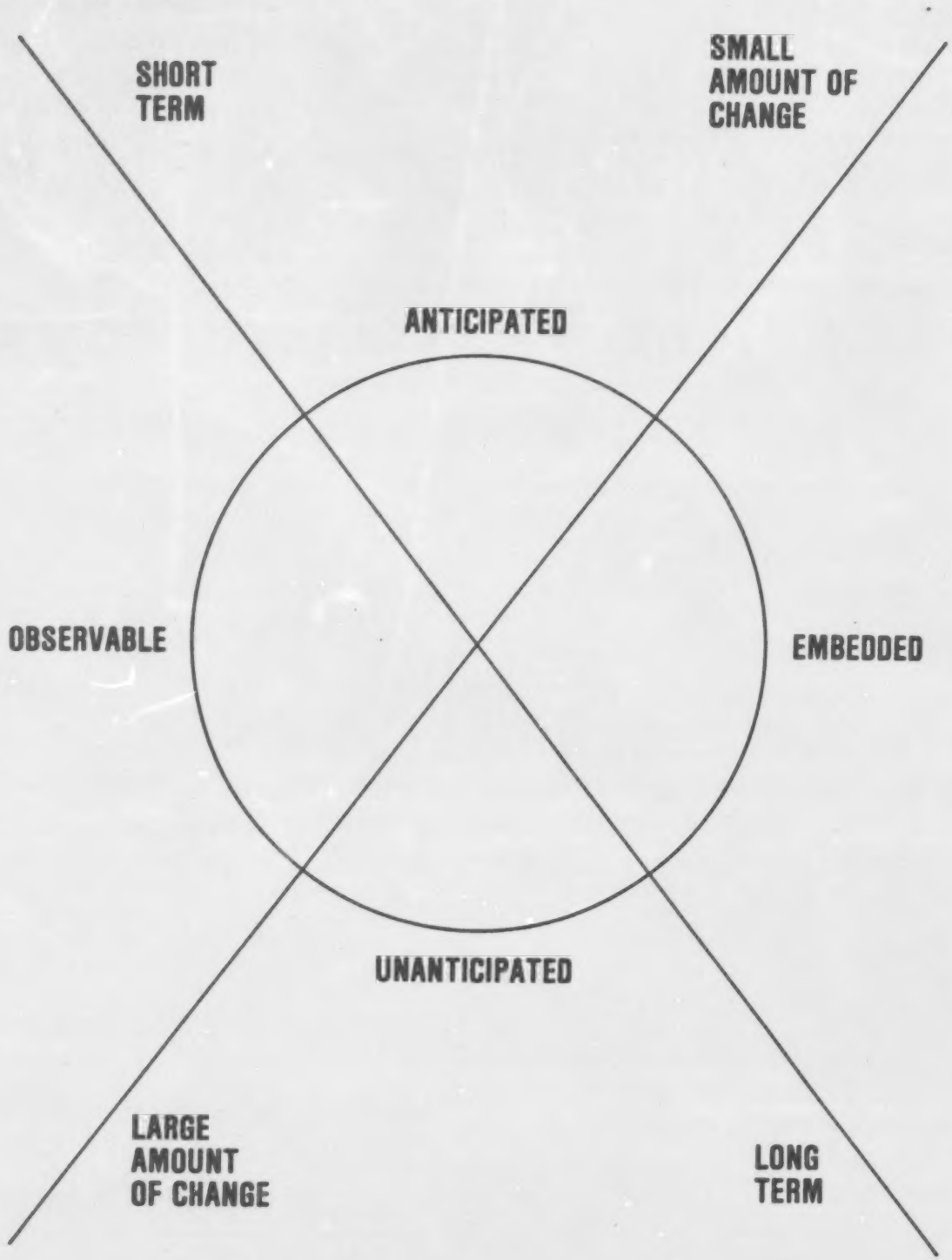

Figure B-3. Dimensions of Impact

Assessment of impact is difficult because effects of product use interact with other variables. Figure B-4 illustrates several dimensions of impact. The two primary ones, time and amount of change, have been recognized in the change process literature for at least a decade. They are included in the impact assessment design by Evans et al. (1982) and are noted in an early review of strategies for effecting change by Wall (1972). These two dimensions interact to explain much of the difficulty in measuring impact.

Large amounts of impact are observable in the short run. The difficulty is that most R&D products produce relatively small impacts that tend to become embedded in a web of other variables. Student achievement scores are affected by aptitude, and the efficiency of a school system is determined in part by its size. Searching for impact data and attributing causal inferences to an R&D product demand careful attention to the relevance of variables and the credibility of data sources.

There are many constraints on the collection of impact data, including some of the following:

- Impact is often embedded in organizational routines.
- Time is required for impact to take place.
- Data collection is expensive.
- Interviewers may need to be trained.

Constraints such as these often prohibit impact assessment. That is why data on product distribution and use should be examined as preliminary measures of impact.

APPENDIX C

GLOSSARY OF TERMS

GLOSSARY OF TERMS

Continuing and comprehensive. This evaluation system should become operational for the forseeable future, collecting evaluative data necessary for accountability and planning purposes. The operation of this system should be within the time and cost constraints of the federal government.

Distribution. This one-way transfer of knowledge is analogous to the spread of information and products defined as level one of dissemination by the Dissemination Analysis Group (1976).

Impact. Impact is change resulting from use of products or information. It may be positive or negative, short-term or long-term, anticipated or unanticipated. This effect of product use may affect individuals, organizations, or societies (Hull, Adams, and Bragg 1983).

Information and products. There are outputs from vocational education R&D in the form of products, such as (1) research reports, (2) knowledge synthesis papers (analyses of research findings), (3) resource guides (cites/describes available materials), (4) administrative/implementation guides (manuals and handbooks for administrators), (5) instructional/implementation guides (manuals and handbooks for teachers), (6) learner materials (instructional resources for students), and (7) conference proceedings (collection of presentations, speeches).

Innovation. Any activity perceived as new by an adopting unit.

National, regional, and state significance. For the purposes of this task, significance refers to products that have been submitted and accepted for inclusion in one of the three databases: Educational Resources Information Center (ERIC), Resources in Vocational Education (RIVE), or Vocational Education Curriculum Materials (VECM).

Programs of national significance. This broad-based term includes nationwide projects, the curriculum coordination centers, the National Center for Research in Vocational Education, graduate leadership development fellowships, a teacher certification program, and a National Occupational Information Coordination Committee.

R&D product. Any output from a project financed with federal program improvement vocational education funds. These funds are narrowly defined as Sections 131, 132, and 133 (and their counterparts in Section 171) in P.L. 94-482.

Utilization. Utilization is the integration of knowledge into personal thoughts and actions, organizational routines, and societal values. It encompasses the next three levels of the DAG definition of dissemination: exchange, choice, and implementation. In fact, it goes beyond these concepts to include modifications in products and environments to upgrade product effectiveness (Hall and Loucks 1977).

Vocational education R&D. Program improvement contract authorized by Subpart 3 of P.L. 94-482, Sections 131, 132, and 133, and corresponding contracts involving applied research, curriculum development, and exemplary and innovative programs, Subpart 2 of P.L. 94-482. Specifically excluded from this definition are supportive services grants and contracts, such as vocational education personnel development and vocational guidance and counseling.

REFERENCES

Adams, Kay A. "Evaluating Models: A Question of Purpose, Not Terminology." Educational Evaluation and Policy Analysis 5, no. 1 (Spring 1983): 55-60.

Adams, Kay A.; McKay, Brenda J.; and Patton, Michael Q. Does Performance-based Teacher Education Work? Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Ahmann, J. Stanley. Needs Assessment for Program Planning in Vocational Education. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1976.

Anderson, Jean, and Hull, William L. Can Research Help Mentally Handicapped Learners Explore Careers? Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Arizona Department of Education. Educational Needs Assessment Handbook. Phoenix: Arizona Department of Education, June 1976.

Baker, Robert L., and Schutz, Richard E. Instructional Product Development. New York: Van Nostrand Reinhold Company, 1971.

Berman, Paul, and McLaughlin, Milbrey W. Federal Programs Supporting Educational Change, Vol. VIII: Implementing and Sustaining Innovations. Santa Monica, CA: Rand, 1978.

Boerrigter, Glenn. "The Impact of Federal Funds and Establishment of Priorities for Research in Vocational and Technical Education." In Regional Research Conference in Vocational and Technical Education for Secondary and Post-Secondary Personnel. Blacksburg, VA: Virginia Polytechnic Institute and State University, April, 1976.

Boerrigter, Glenn C. "Federal Priorities and Patterns of Research Support, 1974-82." In Vocational Education Research in the 1980s, edited by Henry David, Howard F. Hjelm, and Robert C. Harris. Bloomington, IN: American Vocational Education Research Association, 1983.

Bragg, Debra D.; Hull, William L.; and Adams, Kay A. The Impact of Research and Development on Vocational Education for Handicapped Learners. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Budke, Wesley E. Vocational Education Program Improvement: An Analysis of State-Administered Projects in FY 1978 - FY 1982. Columbus: The National Center for Research in Vocational Education, The Ohio State University, January 1983.

Committee on Vocational Education Research and Development. Assessing Vocational Education Research and Development. Washington, D.C.: National Academy of Sciences, 1976.

Crandall, David P.; Bauchner, Joyce E.; Loucks, Susan F.; and Schmidt, William H. Models of the School Improvement Process: Factors Contributing to Success. Andover, MA: The NETWORK, Inc., March 1982.

David, Henry. "Alternative Vocational Education Research Agendas." In Vocational Education Research in the 1980s, edited by Henry David, Howard F. Hjelm, and Robert C. Harris. Bloomington, IN: American Vocational Education Research Association, 1983.

Development Associates, Inc. An Evaluation of Vocational Exemplary Projects: Part D, Vocational Education Act Amendments of 1968. Washington, DC: Development Associates, Inc., March 1975.

Dissemination Analysis Group. Educational Dissemination in Relation to Public Elementary and Secondary Schools. Washington, DC: Department of Health, Education, and Welfare, Office of the Assistant Secretary for Education, 30 September 1976.

Evans, Rupert N.; Russell, Earl B.; Barnard, Wynette S.; and Sanders, Carol S. Impact Assessment Design. Champaign: Illinois State Board of Education, June 1982.

Florida Research Coordinating Unit. An Approach to Program Improvement. Florida State Department of Education, 10 March 1982.

Fullan, Michael, and Pomfret, Alan. "Determinants of Implementation." In Review of Educational Research. Washington, DC: American Educational Research Association, 1977.

General Accounting Office. What Is the Role of Federal Assistance for Vocational Education? Washington, DC: Government Printing Office, 1974.

Hall, Gene E., and Loucks, Susan F. "A Developmental Model for Determining Whether the Treatment Is Actually Implemented." American Education Research Journal 14 (1977): 263-276.

Haney, Walt. "Federal Requirements for the Evaluation of Vocational Education Programs." Paper prepared for the Vocational Education Study of the National Institute of Education, The Huron Institute, Cambridge MA, 1980.

Hu, T., and Stromsdorfer, E. W. An Analysis of the Impact of Applied Research and Demonstration Projects in Vocational Education. Washington, DC: National Academy of Sciences, 1975.

Hughes, Ruth P. "Research Directions for Vocational Education: A Researcher's Perspective." In Vocational Education Research in the 1980s, edited by Henry David, Howard F. Hjelm, and Robert C. Harris. Bloomington, IN: American Vocational Education Research Association, 1983.

Hull, William L. The Distribution of ERIC-Accepted Vocational Education R and D Products. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1982.

Hull, William L. Research and Development Product Utilization in Vocational Education. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1980.

Hull, William L. Summary of Dissemination Outcomes. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1983.

Hull, William L.; Adams, Kay A.; and Bragg, Debra D. R&D Impact Criteria for Improving Vocational Education Programs. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1983.

Kim, Jin Eun. "Federal Policy for and Impact Studies of R&D Projects in Vocational Education." Educational Evaluation and Policy Analysis 4, No. 4 (Winter 1982): 421-437.

Klein, Susan. "Possibilities for Increased Quality Control of Instructional Materials and Programs." In Implementing Change in Occupational Education. Ithaca, NY: Cornell Institute for Research and Development in Occupational Education, September 1978.

Louis, Karen S.; Rosenblum, Sheila; and Molitor, James A. Strategies for Knowledge Use and School Improvement: A Summary. Washington, DC: U.S. Department of Education, The National Institute of Education, July 1981.

Magisos, Joel H.; and Moore, Allen B. Evaluation of Vocational Education R&D Programs: An Integrative Analysis of Recent Studies. Columbus: The Center for Vocational Education, The Ohio State University, 1977.

McCage, Ronald D. "Managing Program Improvement: One State's Approach." Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1980.

McCaslin, N. L.; and Lave, Janice. Needs Assessment and Career Education: An Approach for States. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1976.

Modisette, Laura J.; and Bonnett, Deborah G. Can Research Improve Career Guidance Programs in Rural Schools? Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Mohamed, Dominic A. "Assessing the Impact of Earlier Research and Development in Vocational Education." Journal of Industrial Teacher Education 20 (1983): 6-11.

Office of Vocational and Adult Education. "Program Memorandum OVAE/DID-FY 83-1." Washington, DC: OVAE, U.S. Department of Education, May 1983.

Pincus, John. "Incentives for Innovation in the Public Schools." In Review of Educational Research. Washington, DC: American Educational Research Association, 1974.

Pratzner, Frank C.; and Walker, Jerry P. Programmatic Research and Development in Education. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1972.

The Vocational Education Study: The Final Report. Publication 8. Washington, DC: National Institute of Education, Office of Educational Research and Improvement, September 1981.

Wall, James E. Strategies for Effecting Change in Vocational and Technical Education. Columbus, OH: ERIC Clearinghouse for Vocational and Technical Education, April 1972.

Witkin, Belle Ruth. An Analysis of Needs Assessment Techniques for Educational Planning at State, Intermediate, and District Levels. NIE Project Paper G-74-0062. Washington, DC: National Institute of Education, 19 May 1975. (ED 103 370)

Worthington, Robert M. "Mobilizing the Support of Key Persons, or How to Work with Your State Director." Presented to the East Central Curriculum Management Center on behalf of the National Network for Curriculum Coordination in Vocational and Technical Education, May 1981.